



Geographic Information System

Spatial Statistics II Lab Practice

Dr. Chan, Chun-Hsiang

Department of Geography
National Taiwan Normal University



Outline

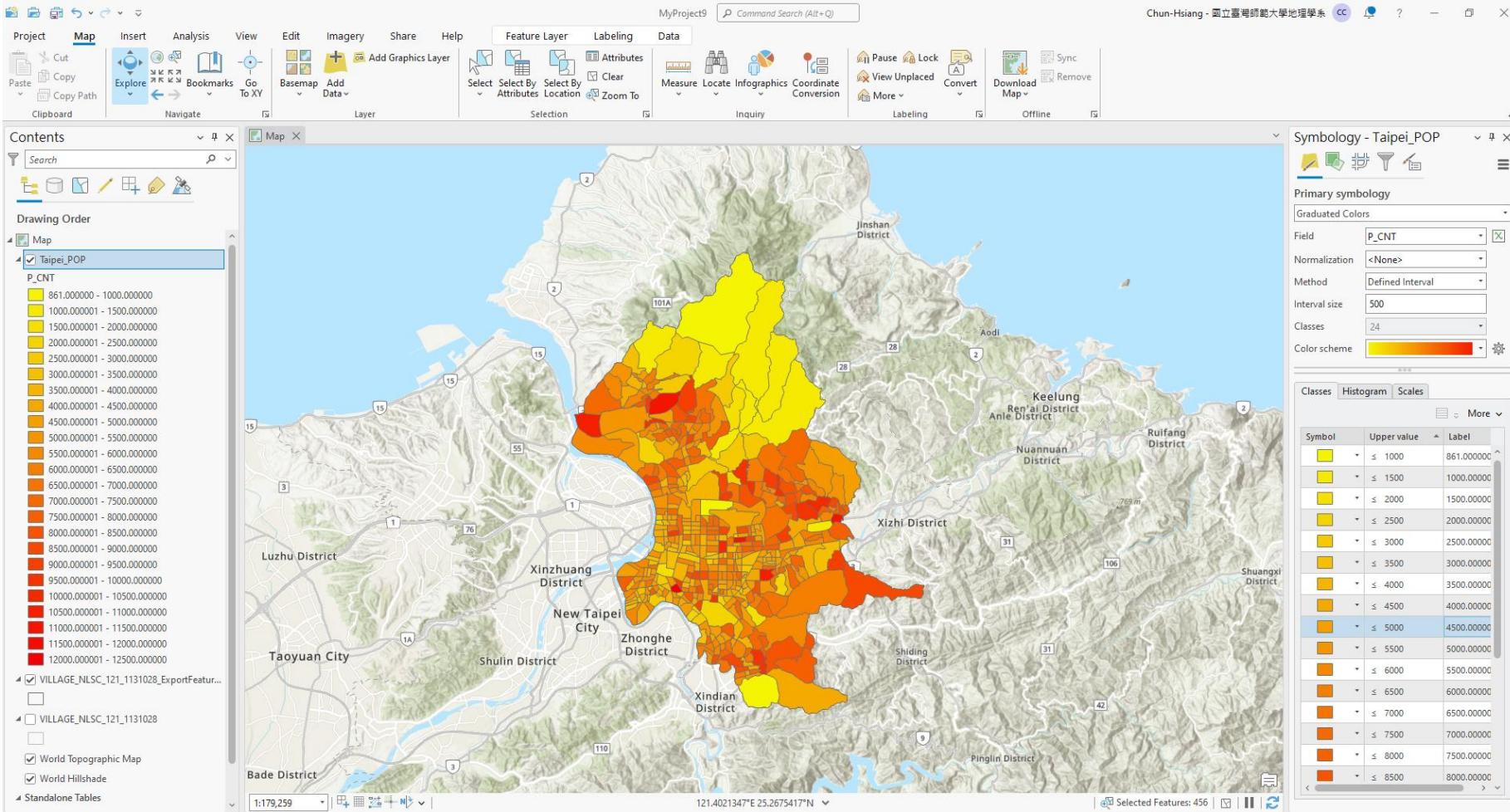
- Identify the Spatial Distribution of Clusters
- Group the Village with Similar Demographic Attributes



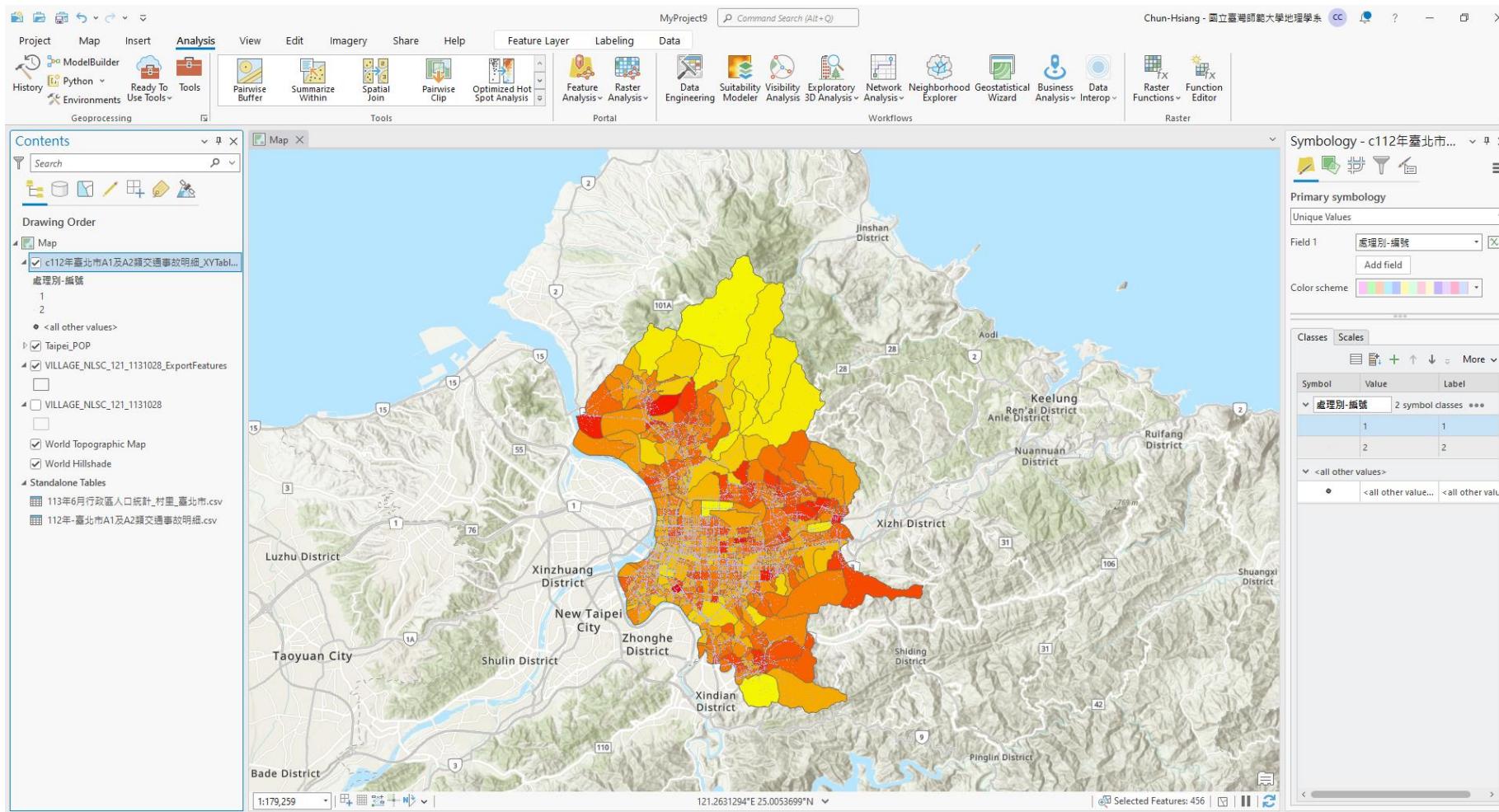
Initial Settings (...)

- 1) Set up the CRS of the map
- 2) Load Taipei Population Data, Taipei Traffic Accident Data, and Taiwan Village Data
- 3) Select all Taipei villages from the Taiwan village data and export as a new feature data named “Taipei_POP”
- 4) Join Taipei population into Taipei_POP
- 5) Use XY Table To Point to convert Taipei traffic accident data into Point data
- 6) Select 112/01 and 112/07 Taipei traffic accident and export as a new feature data named “TrafficAccident_11201” and “TrafficAccident_11207”
- 7) Spatial Join Taipei traffic accident into Taipei_POP

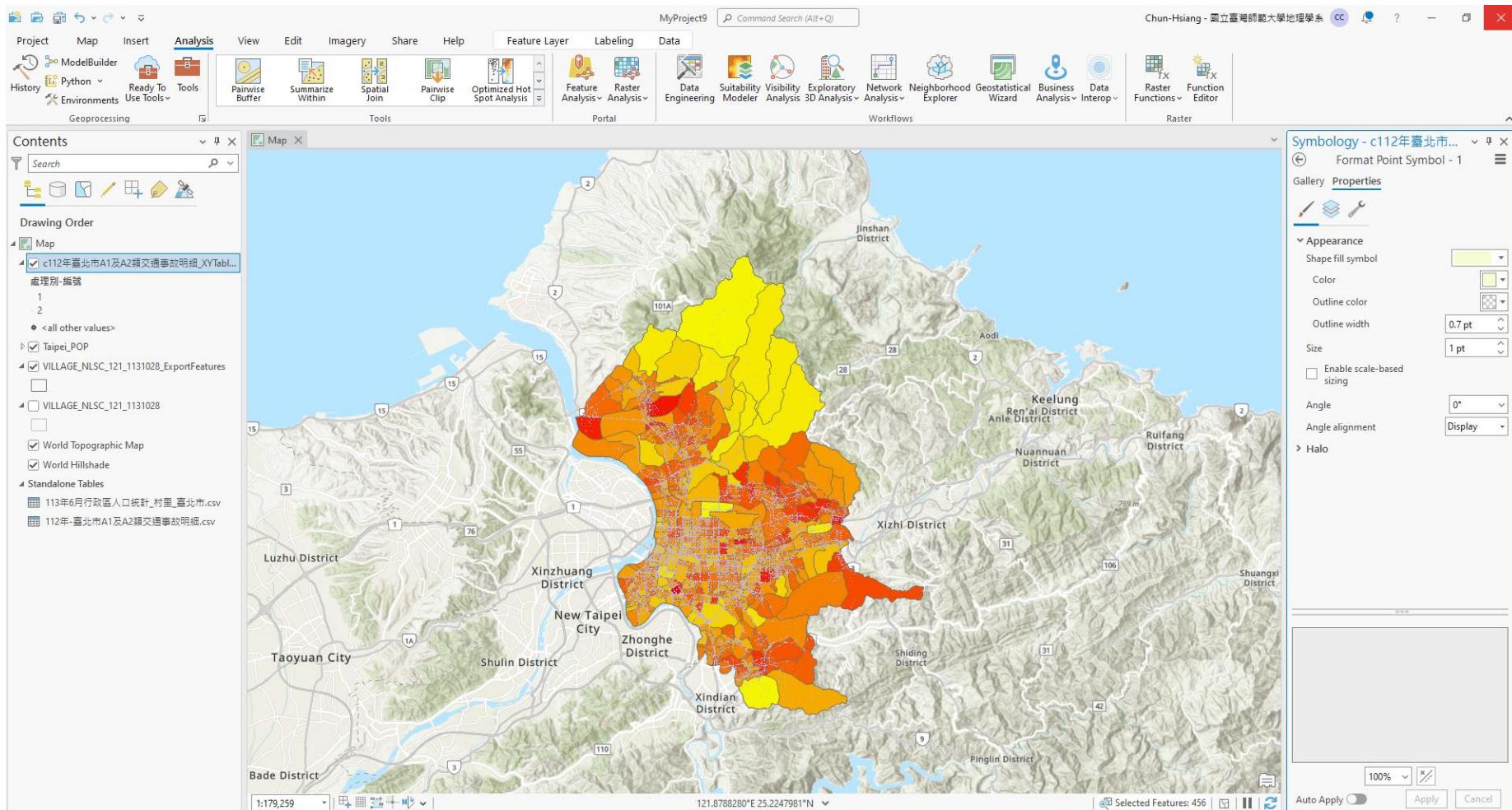
Taipei Population Data



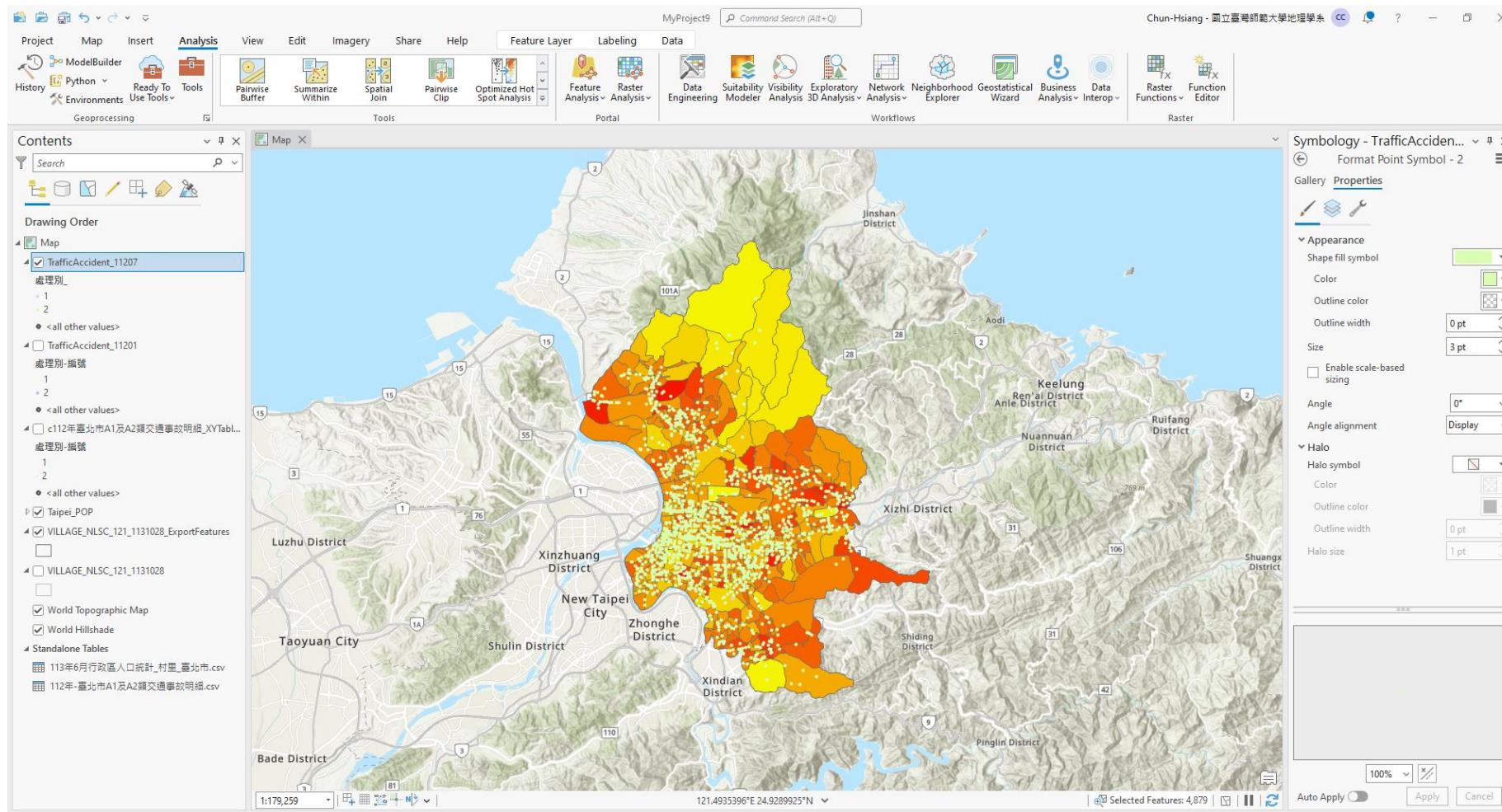
Overlay with Traffic Accident Data



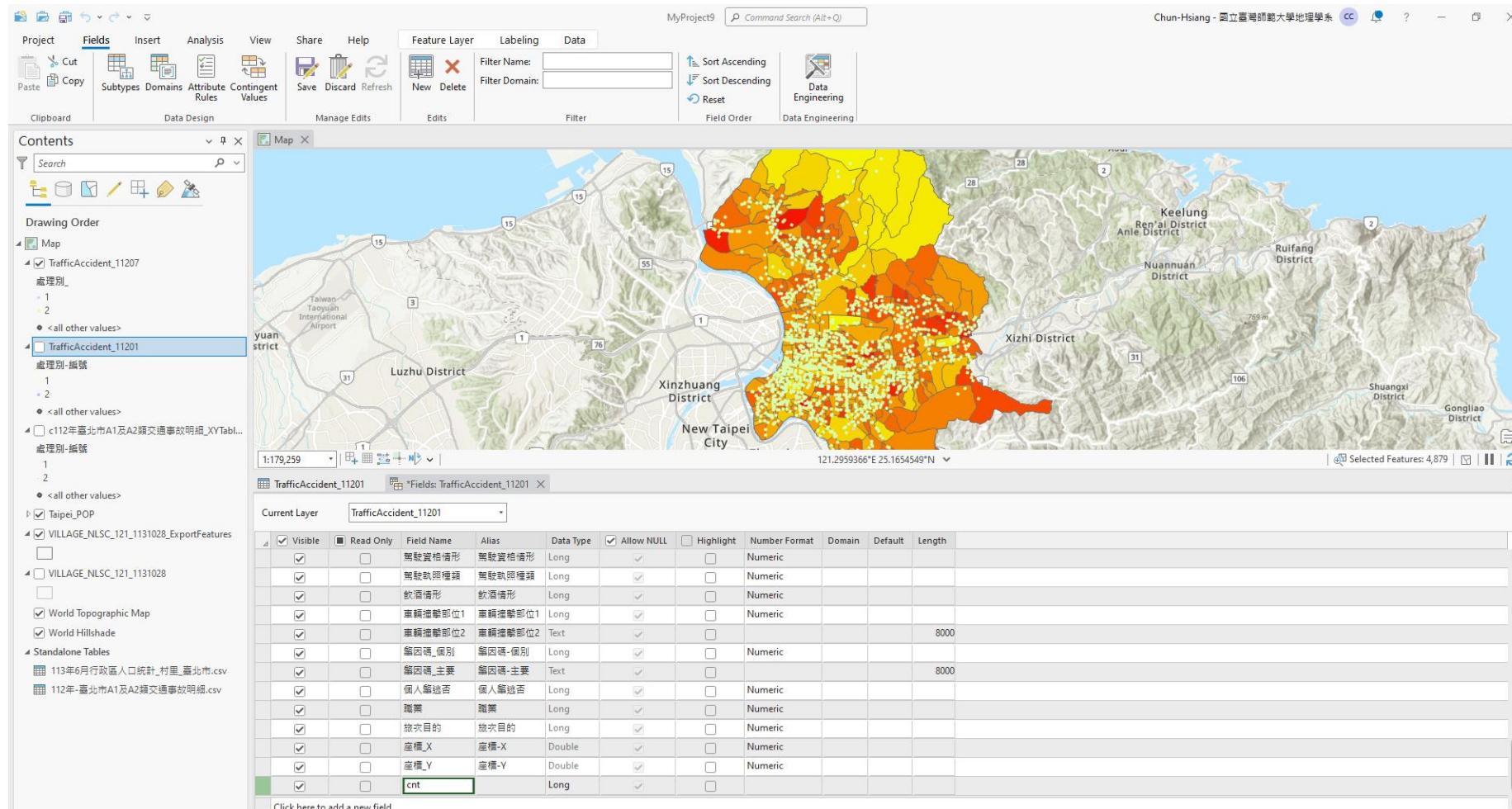
Overlay with Traffic Accident Data



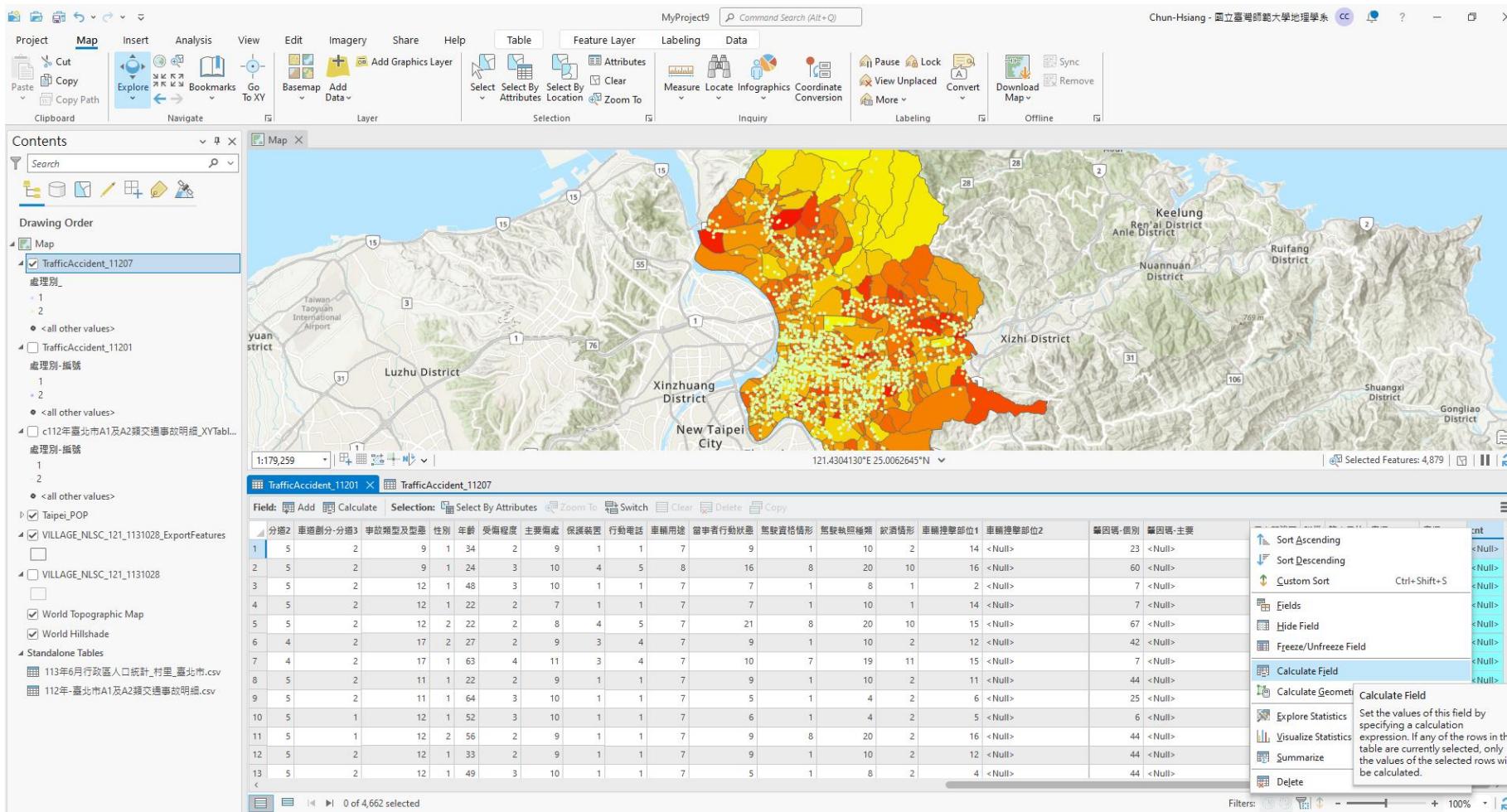
Overlay with Traffic Accident Data



Add a New Field "cnt" to both 11201 & 11207



Fill 1 into “cnt” Field to both 11201 & 11207



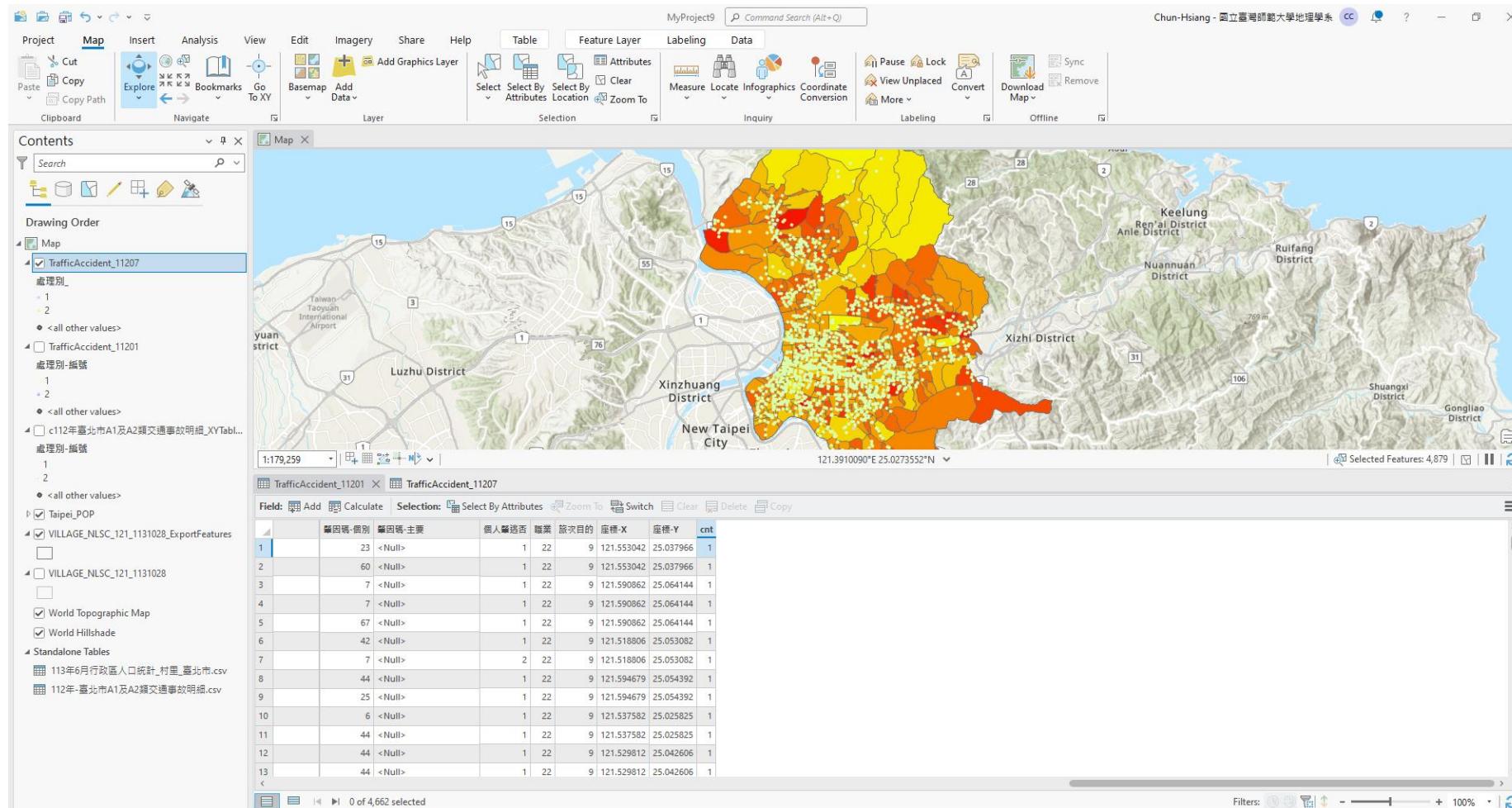
Fill 1 into “cnt” Field to both 11201 & 11207

The screenshot shows the ArcGIS Pro interface with a map of Keelung, Taiwan, displayed. The map includes various districts like Keelung, Ruifang, Nuannuan, Xizhi, Shuangxi, and Gongliao. A 'Calculate Field' dialog box is open in the foreground, overlaid on the map. The dialog box is titled 'Calculate Field' and contains the following information:

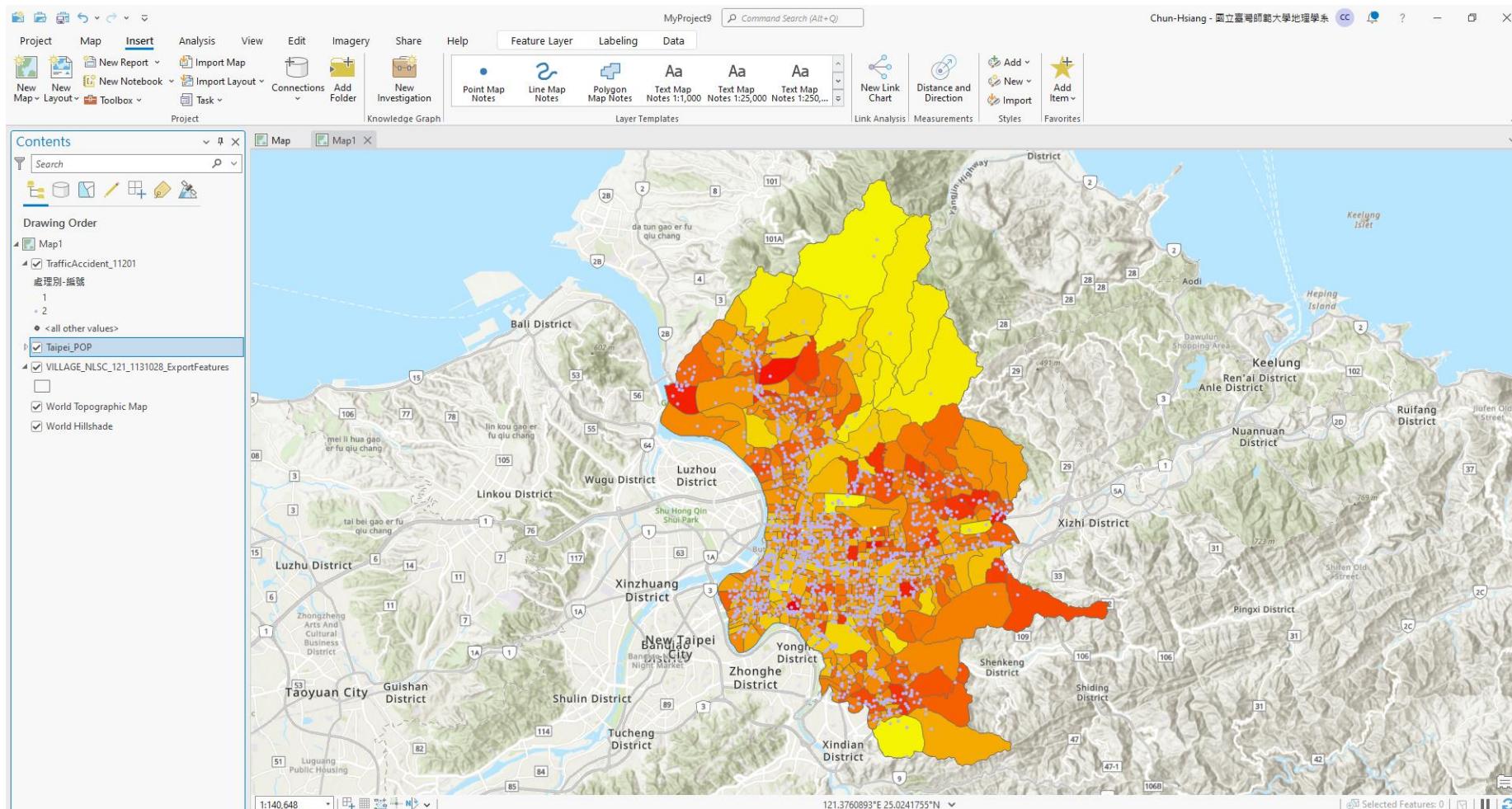
- Input Table:** TrafficAccident_11201
- Field Name (Existing or New):** cnt
- Expression Type:** Python
- Expression:** Fields pane shows:
 - as_integer_ratio()
 - .capitalize()
 - .center()
 - .conjugate()
 - .count()
 - .decode()
 - .denominator()
 - .encode()
- Insert Values:** cnt = 1

The main workspace shows a table named 'TrafficAccident_11201' with 14 rows of data. The columns include: 車輛撞擊部位1, 車輛撞擊部位2, 轉因碼-個別, 轉因碼-主要, 個人筆逃否, 職業, 旅次目的, 座標-X, 座標-Y, and cnt. The 'cnt' column is highlighted in blue, indicating it is the field being modified.

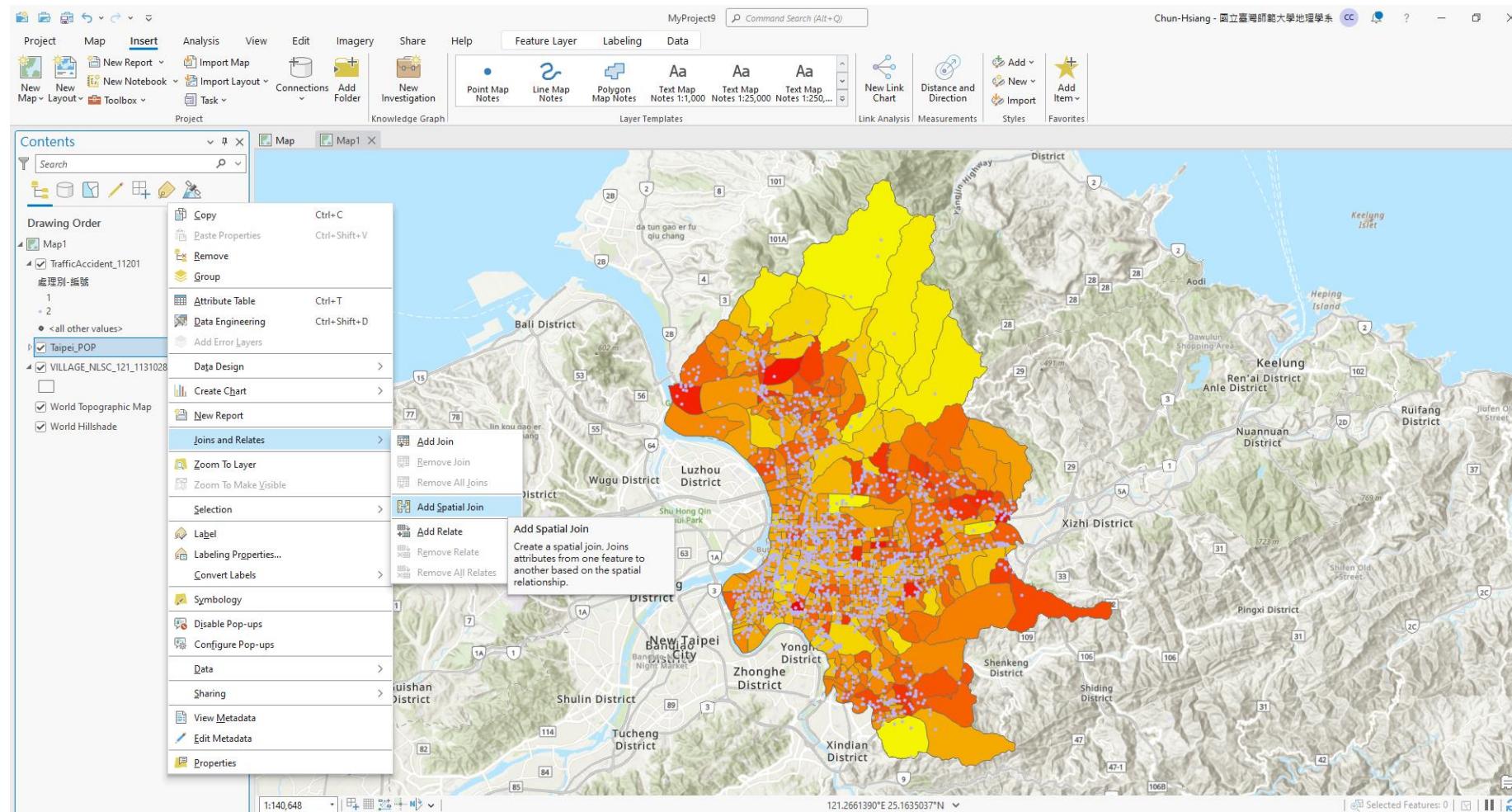
Fill 1 into “cnt” Field to both 11201 & 11207



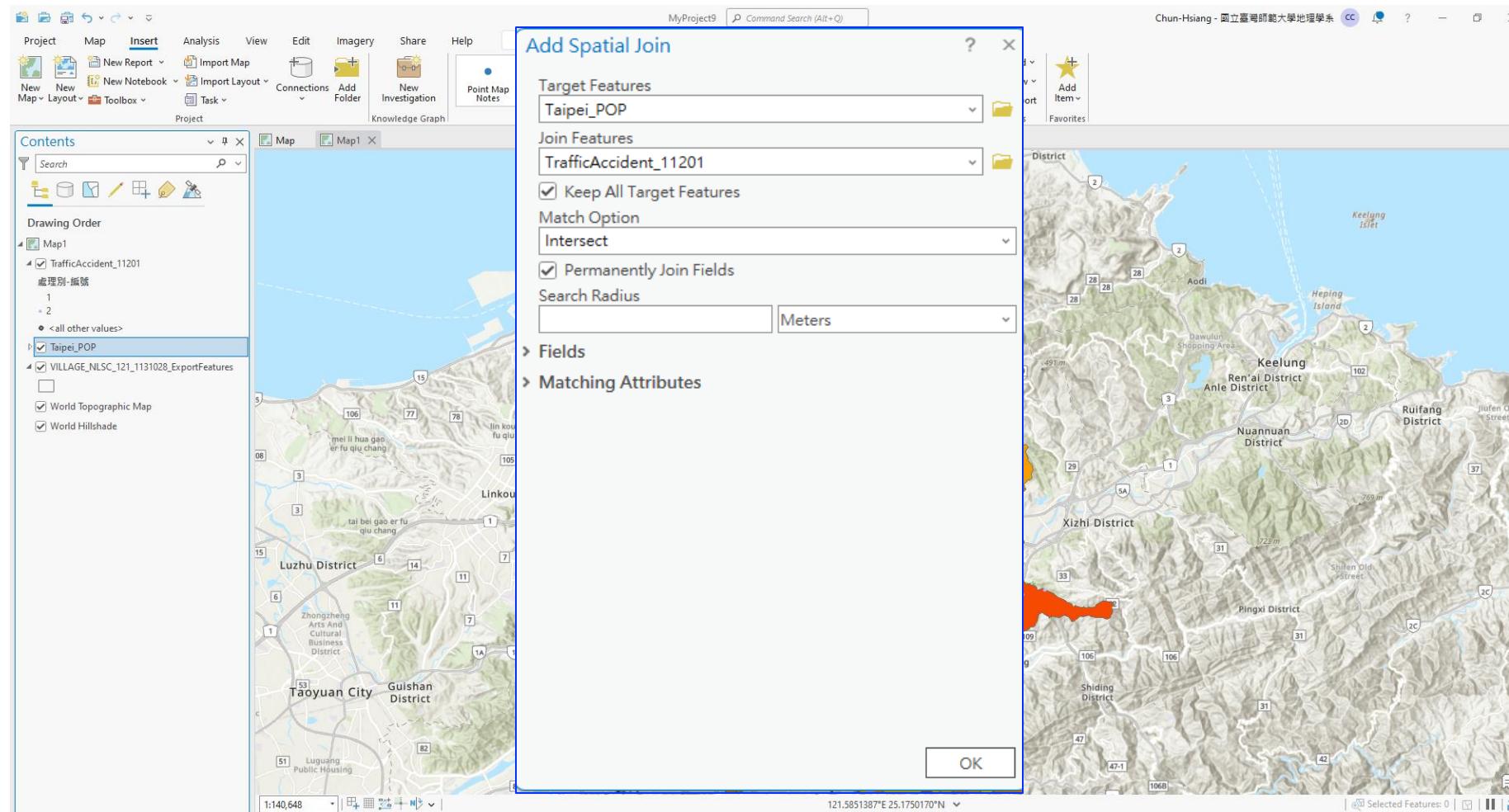
Spatial Join Taipei Traffic Accident Data



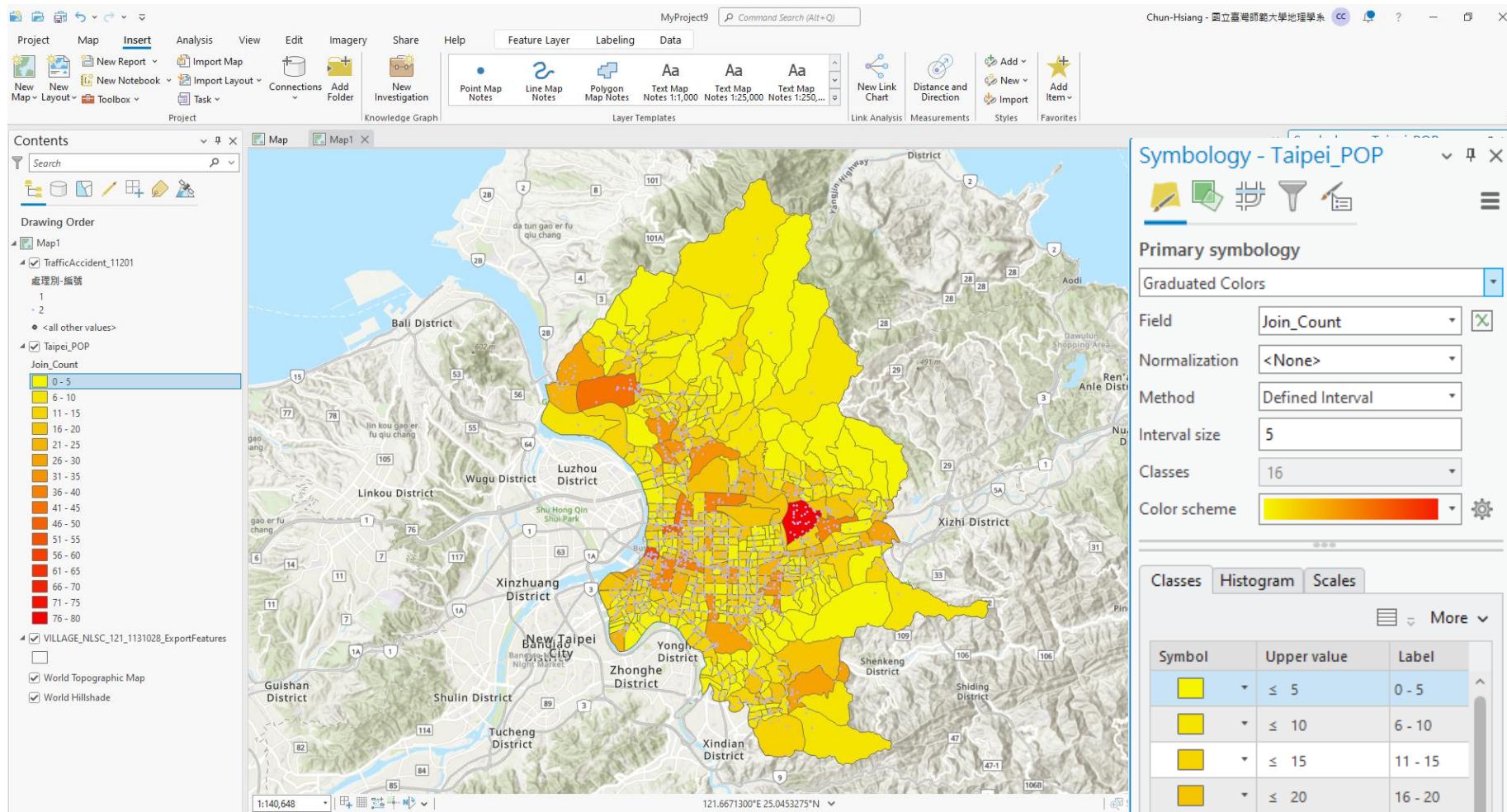
Spatial Join Traffic Accident Data into Village



Spatial Join Traffic Accident Data into Village



Spatial Join Traffic Accident Data into Village

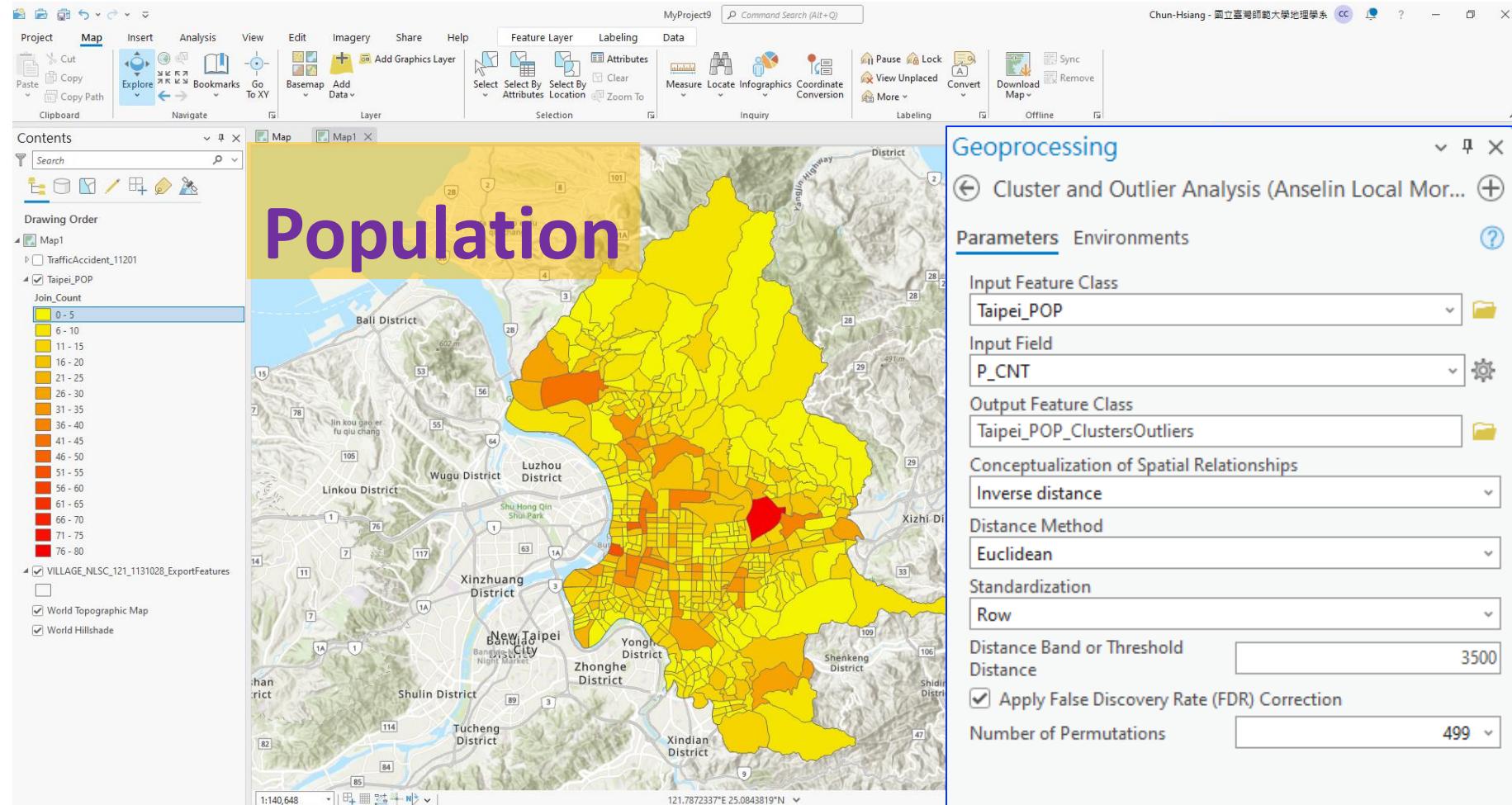


Spatial Statistical Analysis

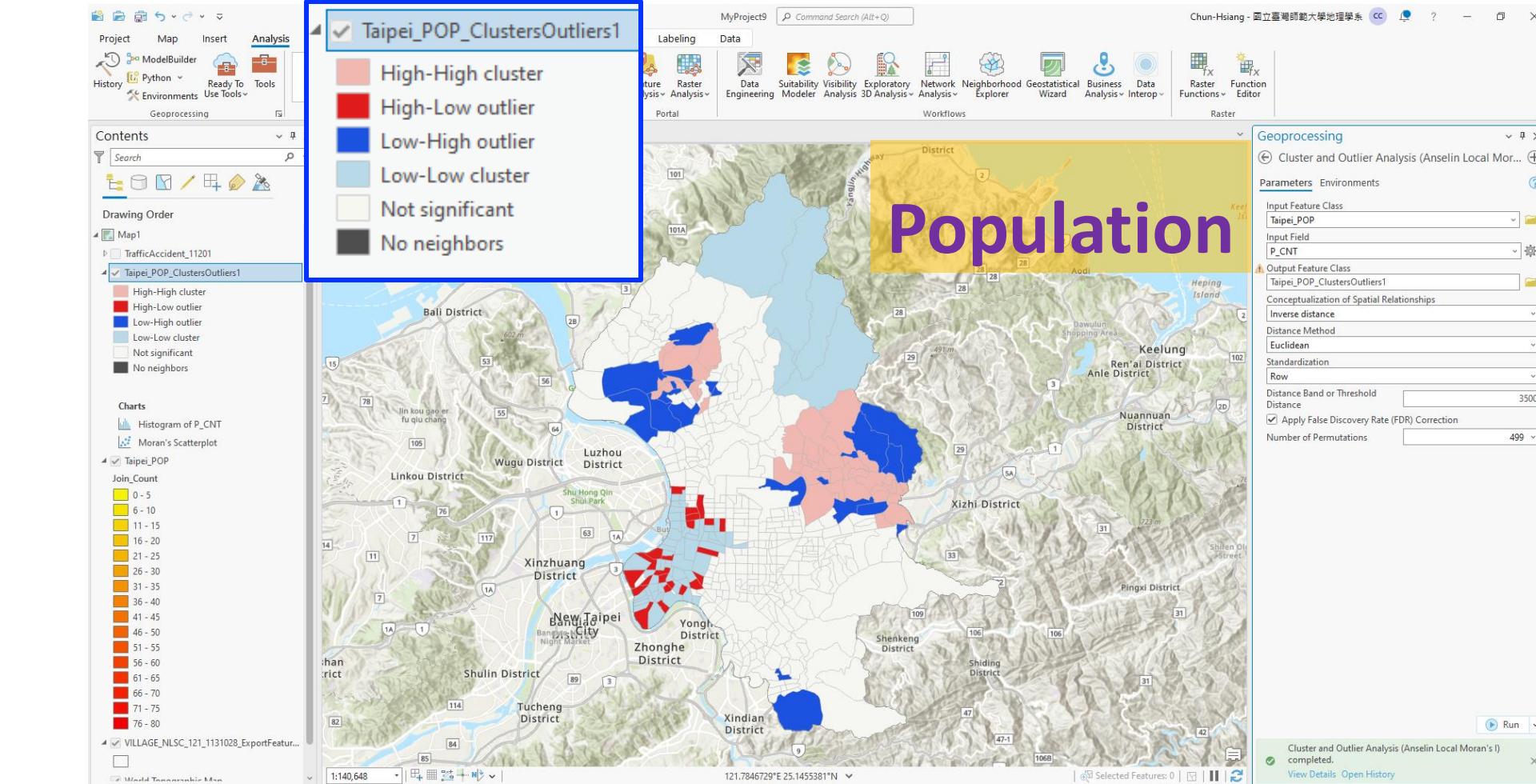
Compute the following functions

- 1) Cluster and Outlier Analysis (Anselin Local Moran's I)
(Population & Traffic Accident)
- 2) Hot Spot Analysis (Getis-Ord G*)
(Population & Traffic Accident)
- 3) Spatial Outlier Detection
(Traffic Accident)
- 4) Density-based Clustering (DBSCAN and OPTICS)
- 5) Multivariate Clustering
(NumCluster: 5 and 10)

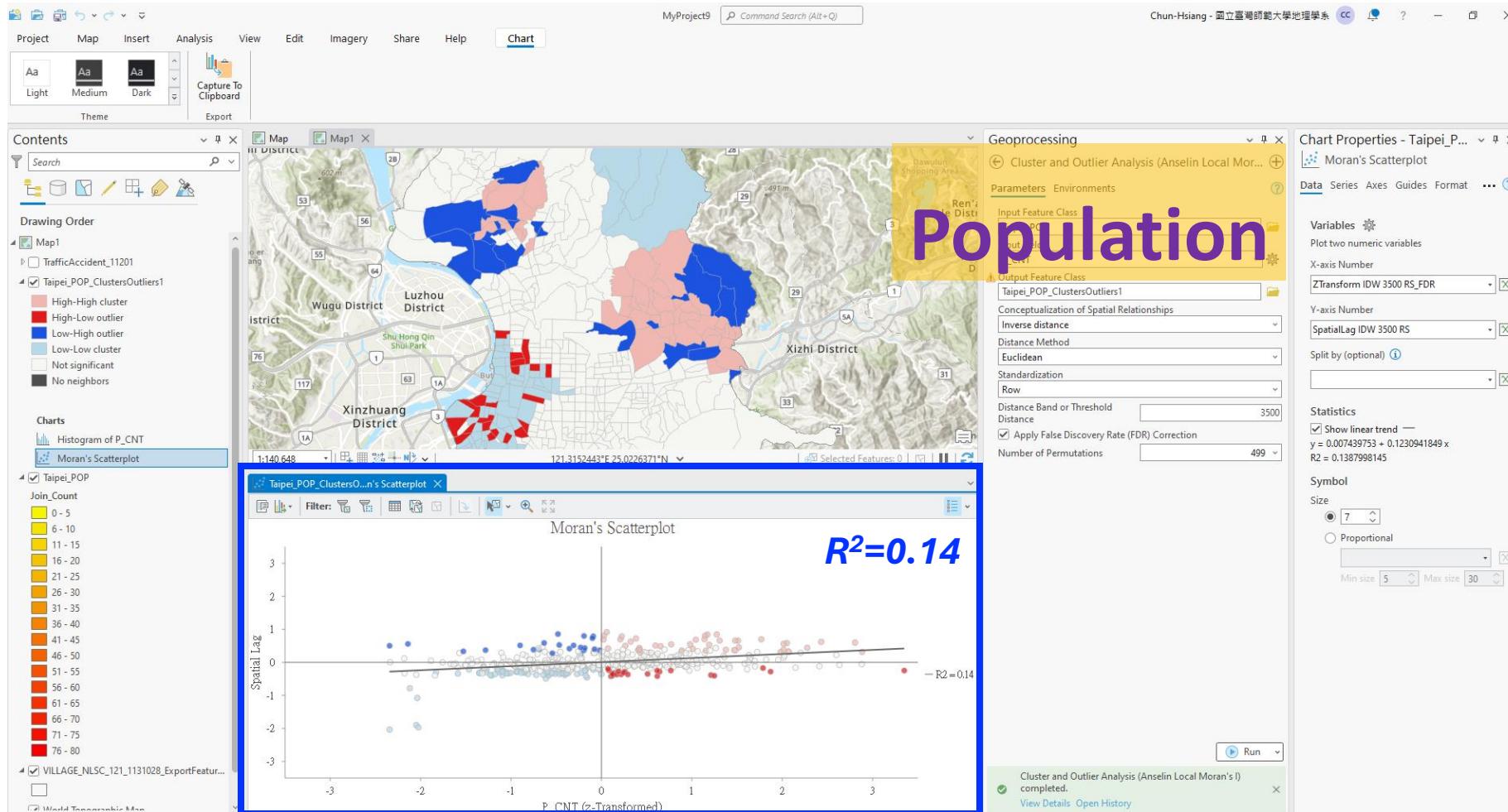
Cluster and Outlier Analysis (Anselin Local Moran's I)



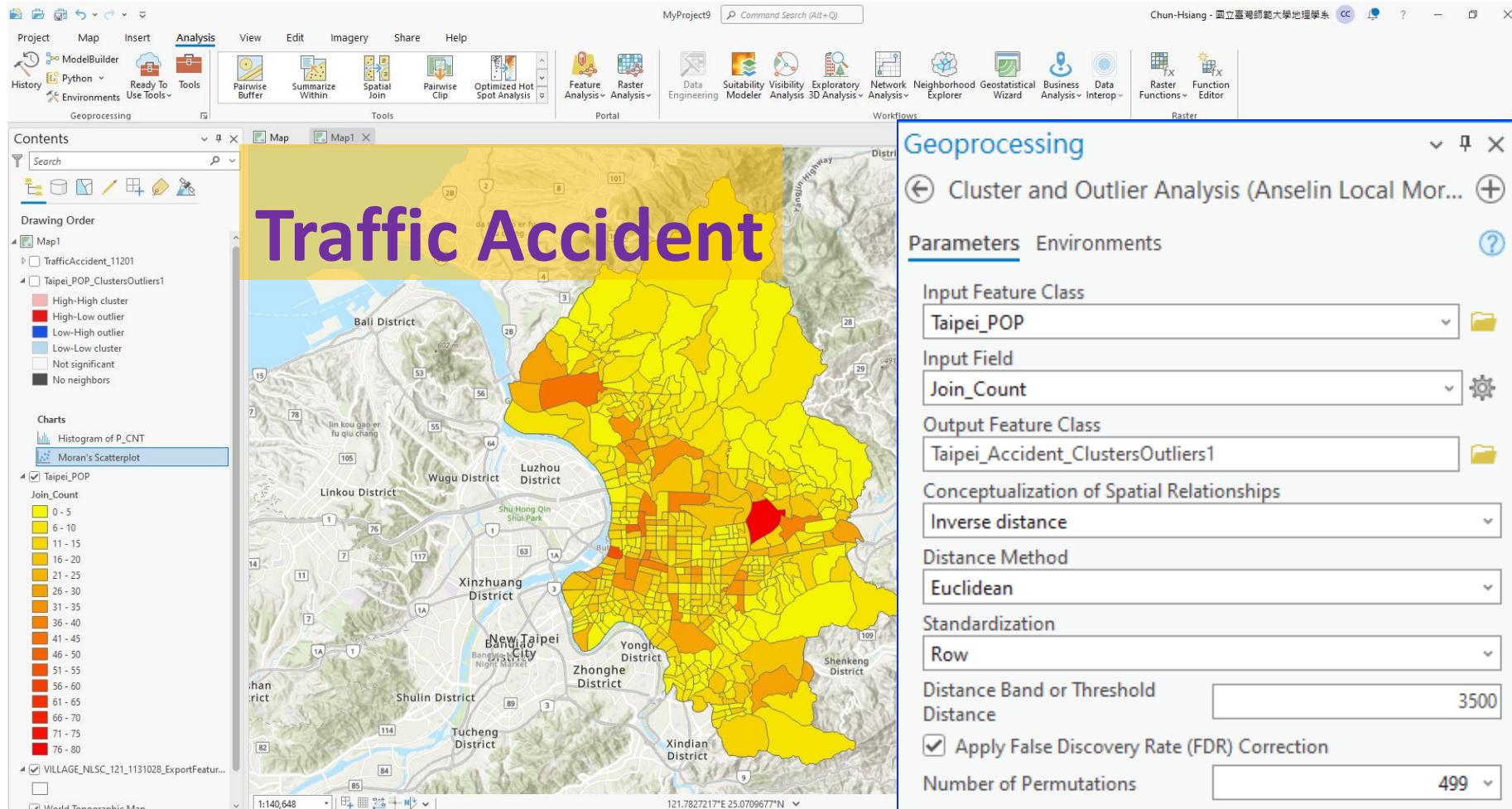
Cluster and Outlier Analysis (Anselin Local Moran's I)



Cluster and Outlier Analysis (Anselin Local Moran's I)

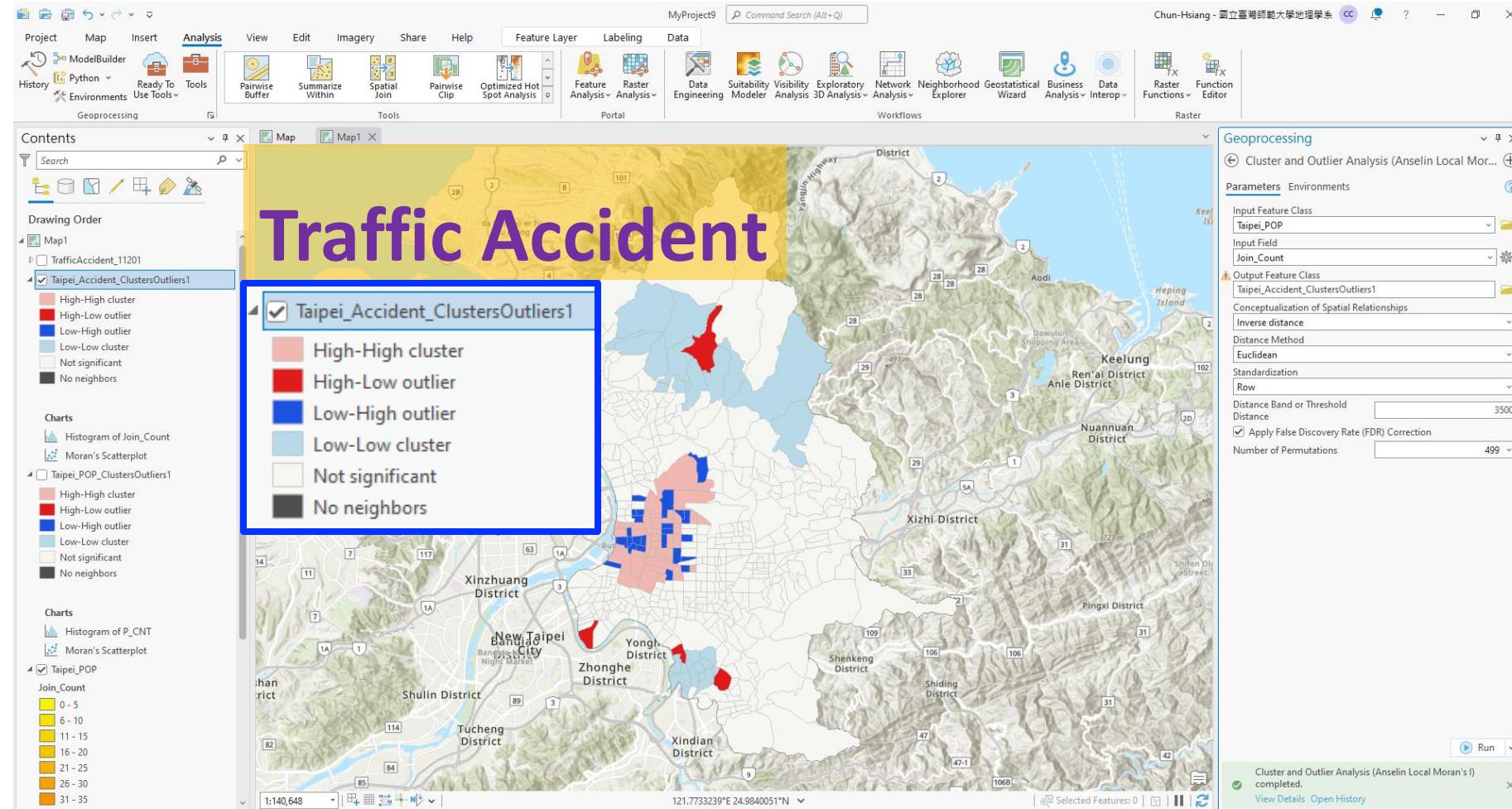


Cluster and Outlier Analysis (Anselin Local Moran's I)

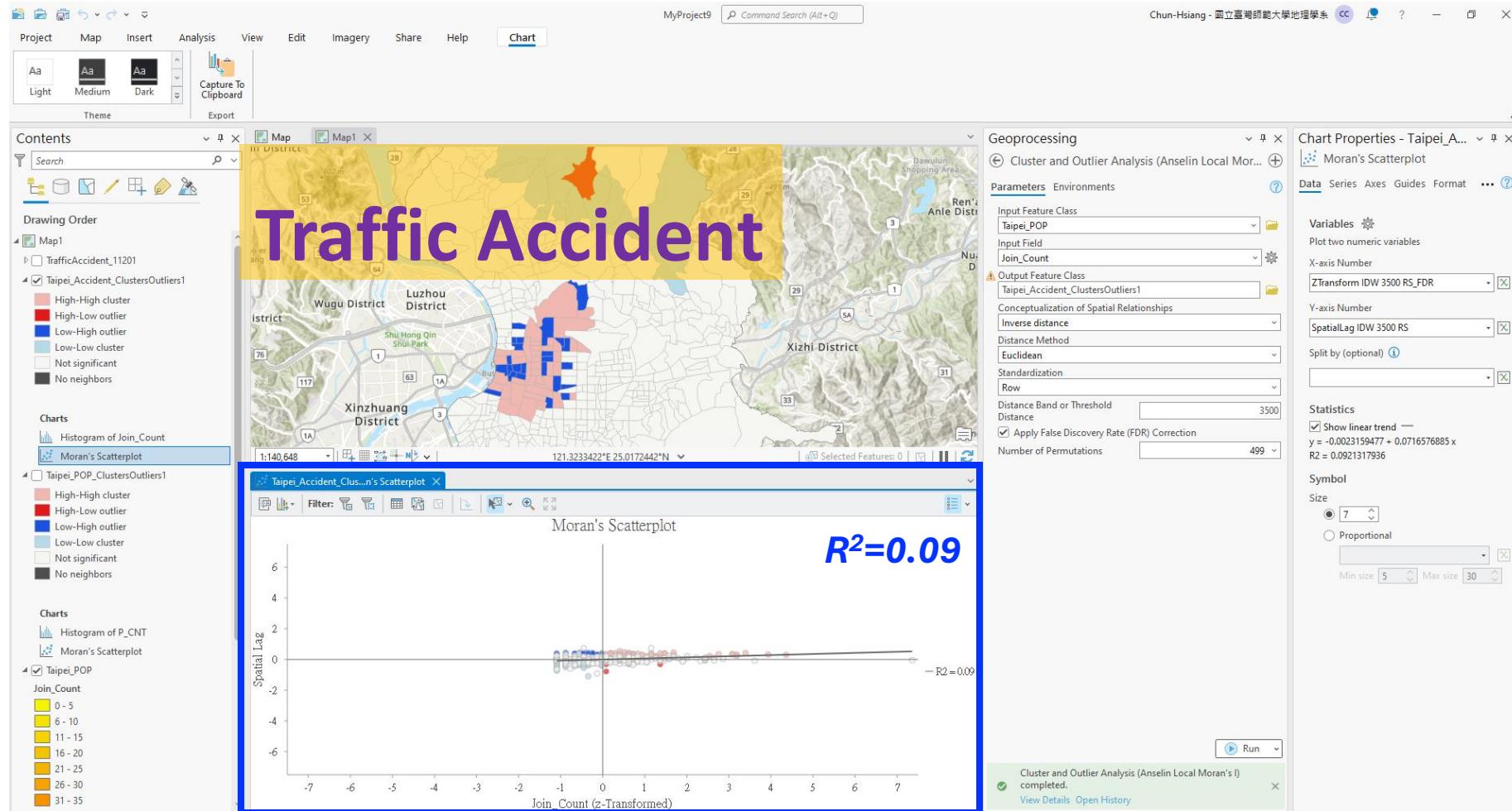


Cluster and Outlier Analysis

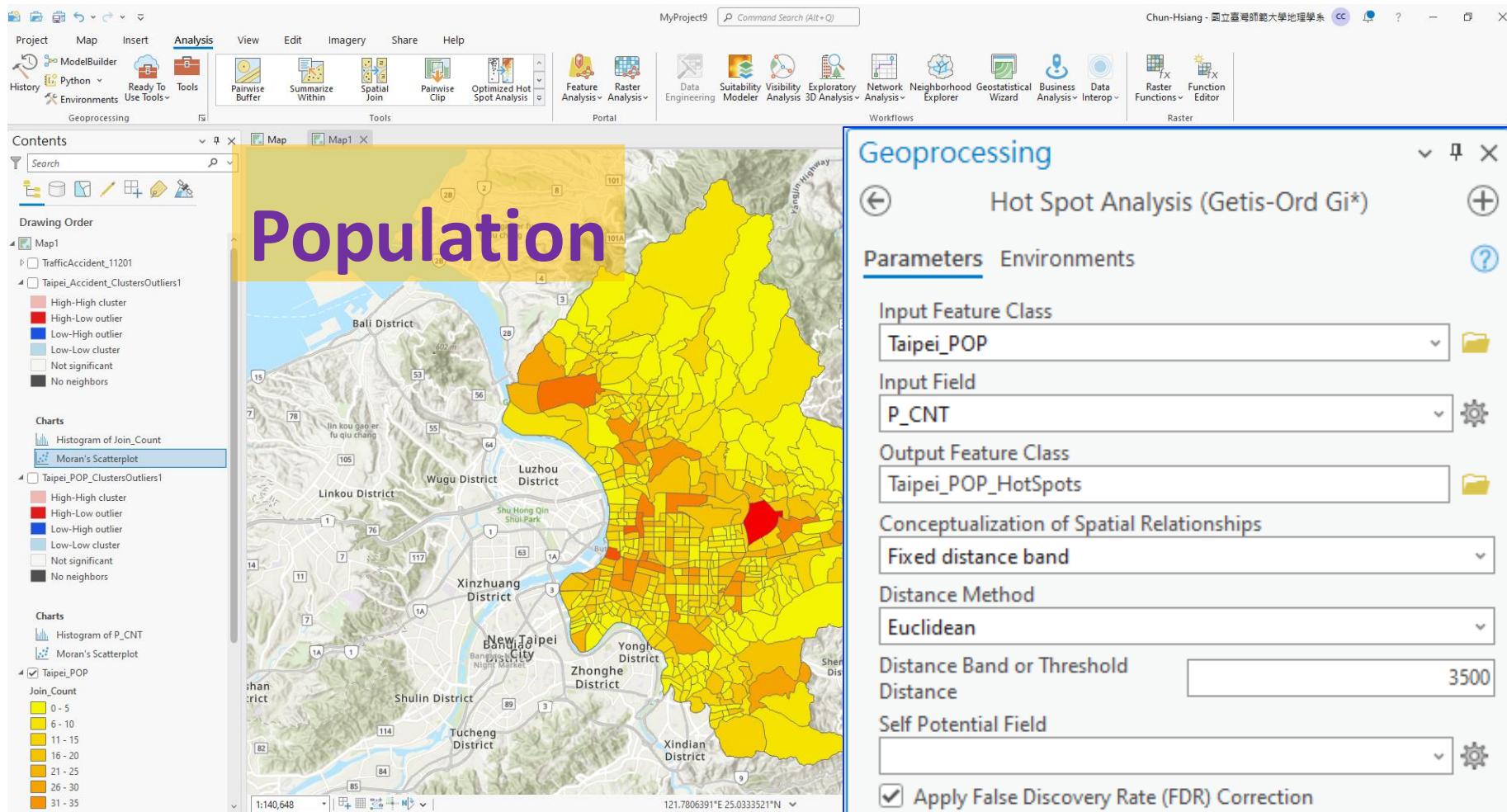
(Anselin Local Moran's I)



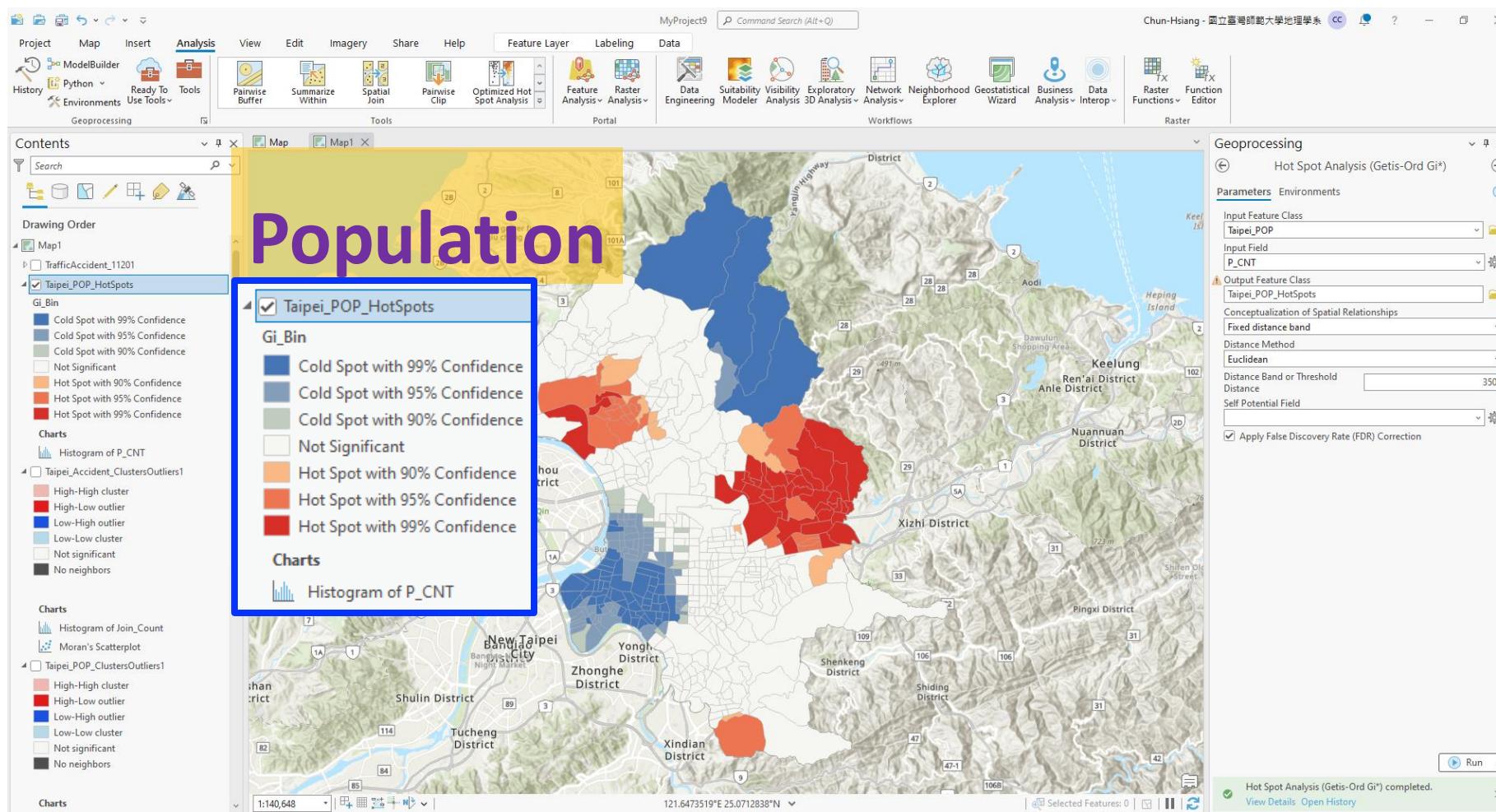
Cluster and Outlier Analysis (Anselin Local Moran's I)



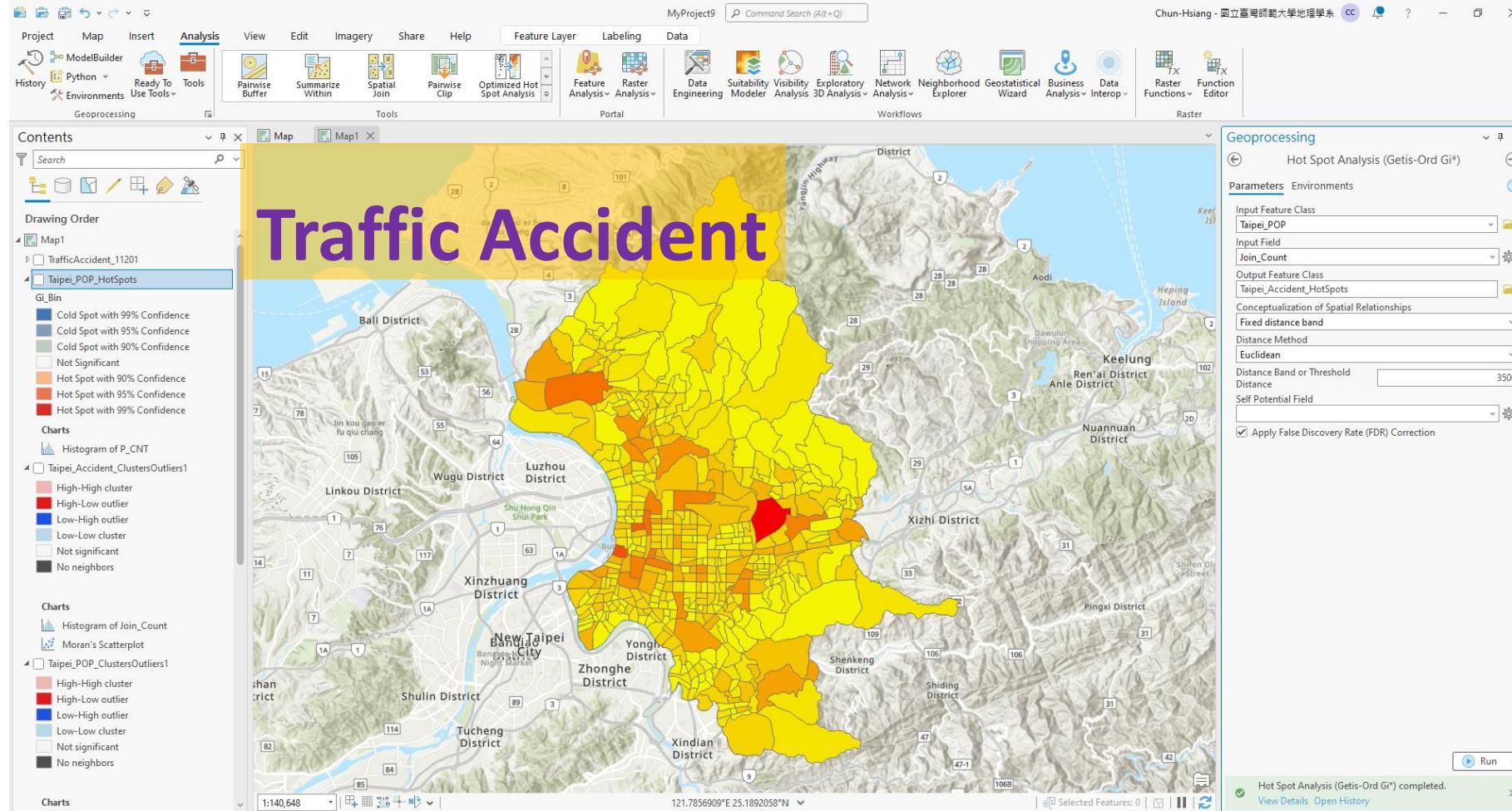
Hot Spot Analysis (Getis-Ord G*)



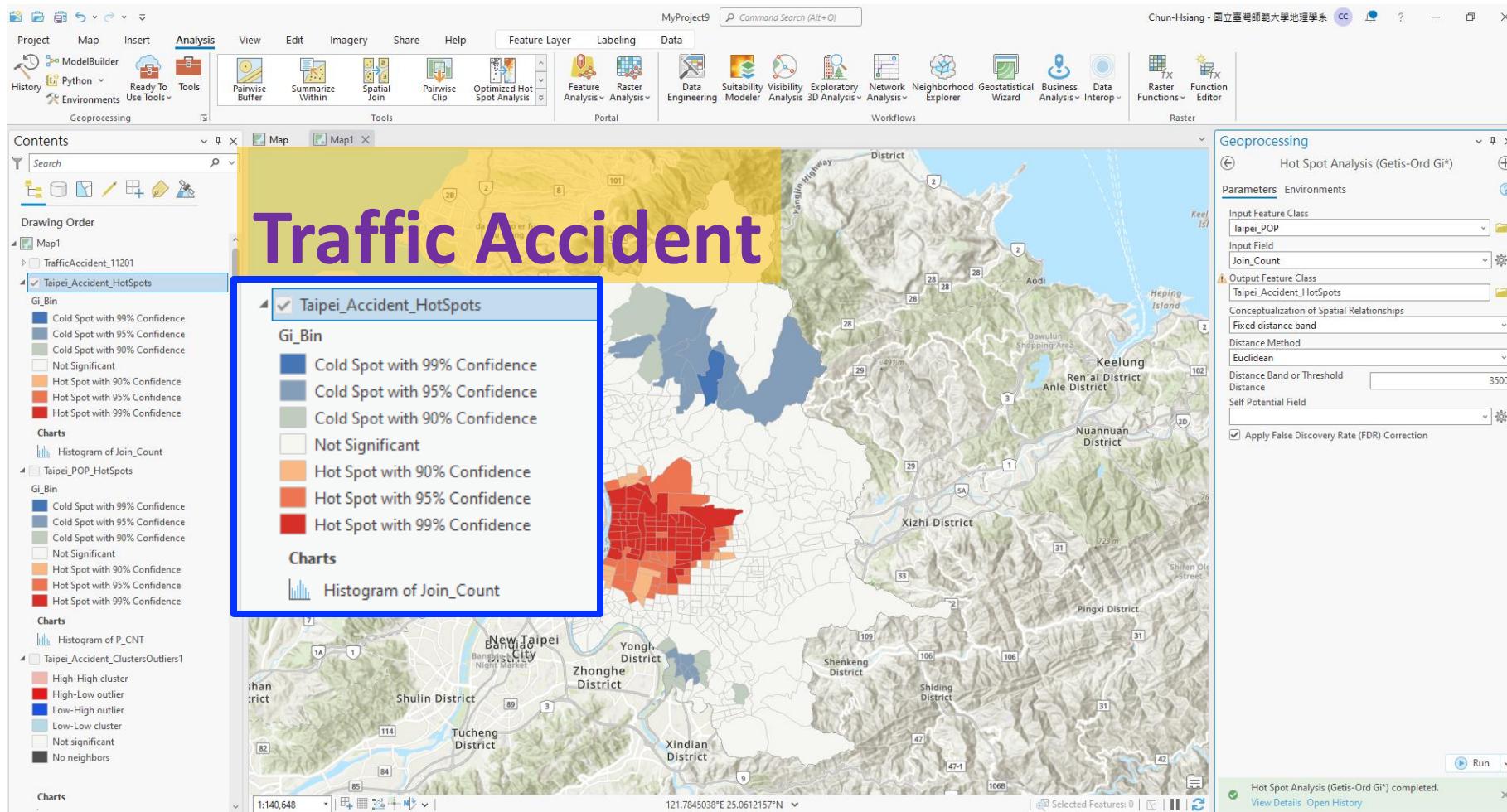
Hot Spot Analysis (Getis-Ord G*)



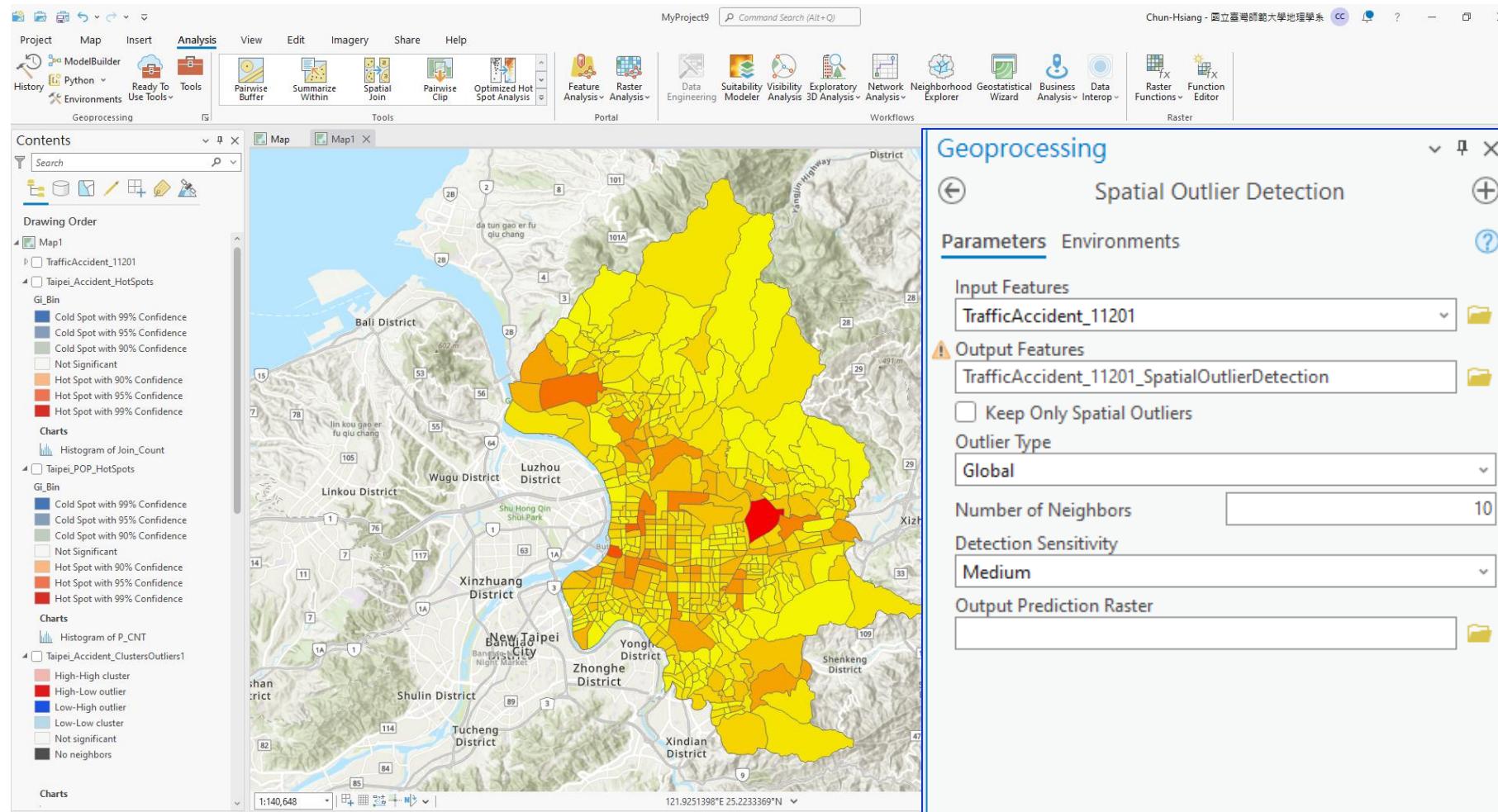
Hot Spot Analysis (Getis-Ord G*)



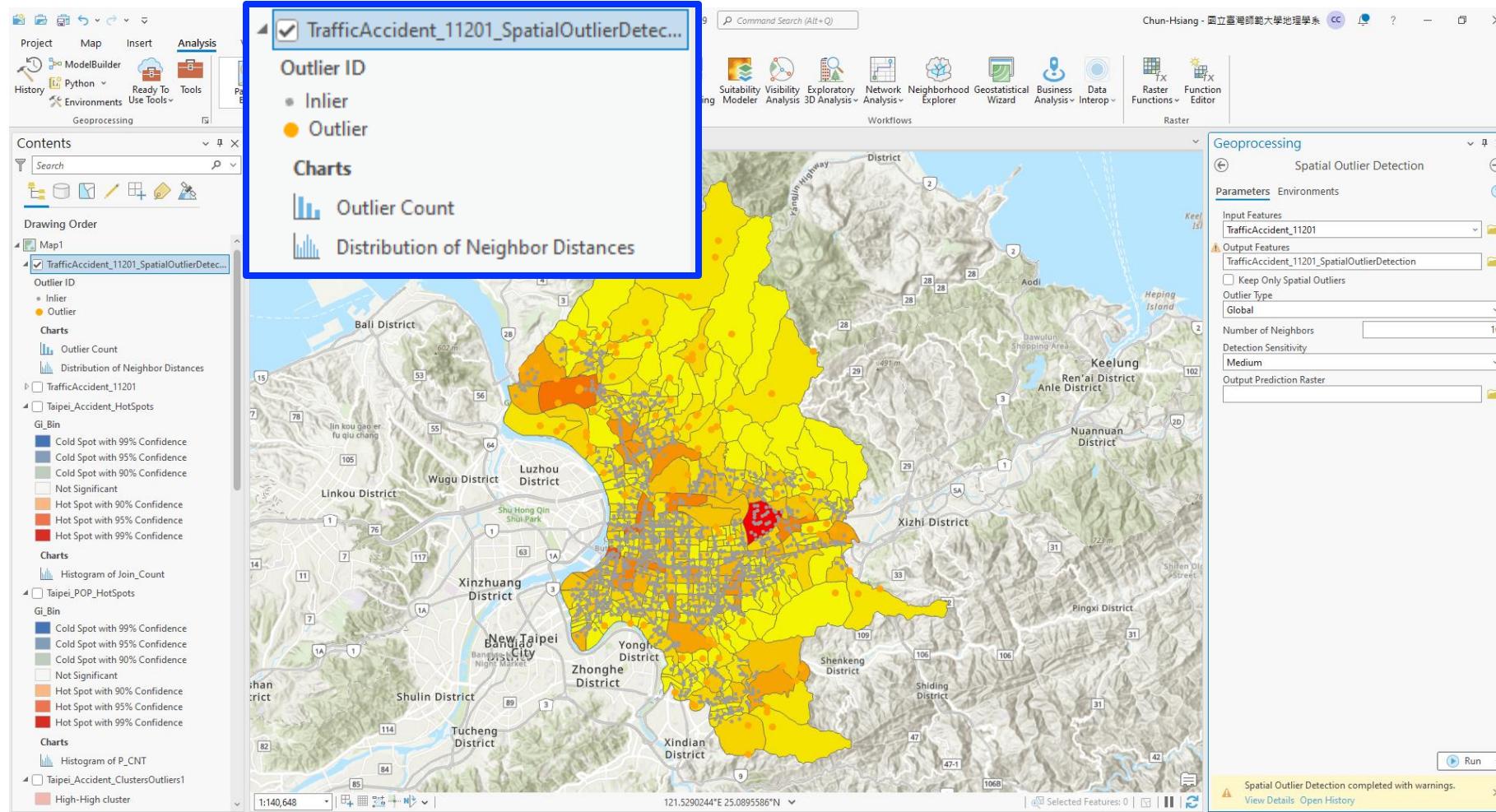
Hot Spot Analysis (Getis-Ord G*)



Spatial Outlier Detection

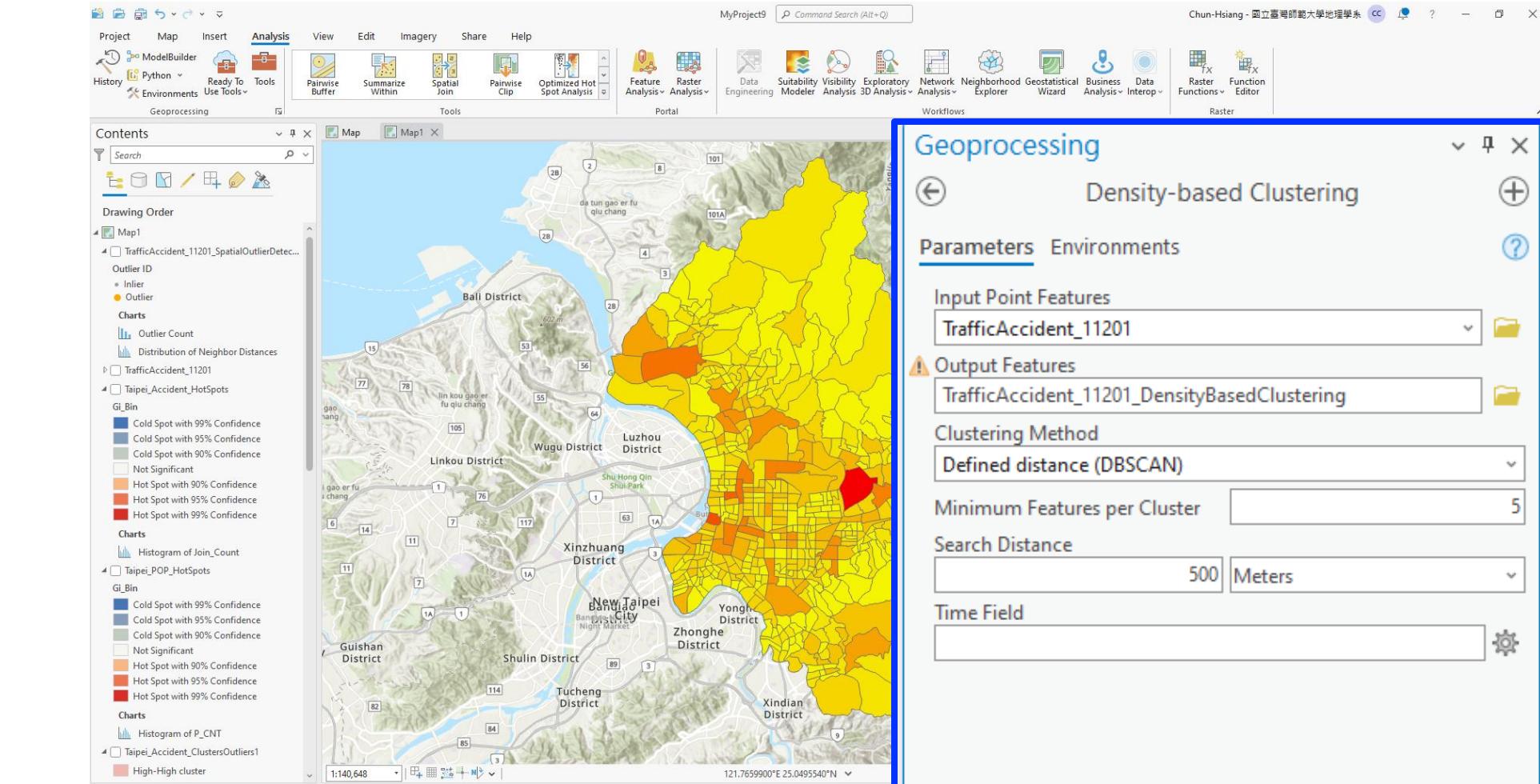


Spatial Outlier Detection



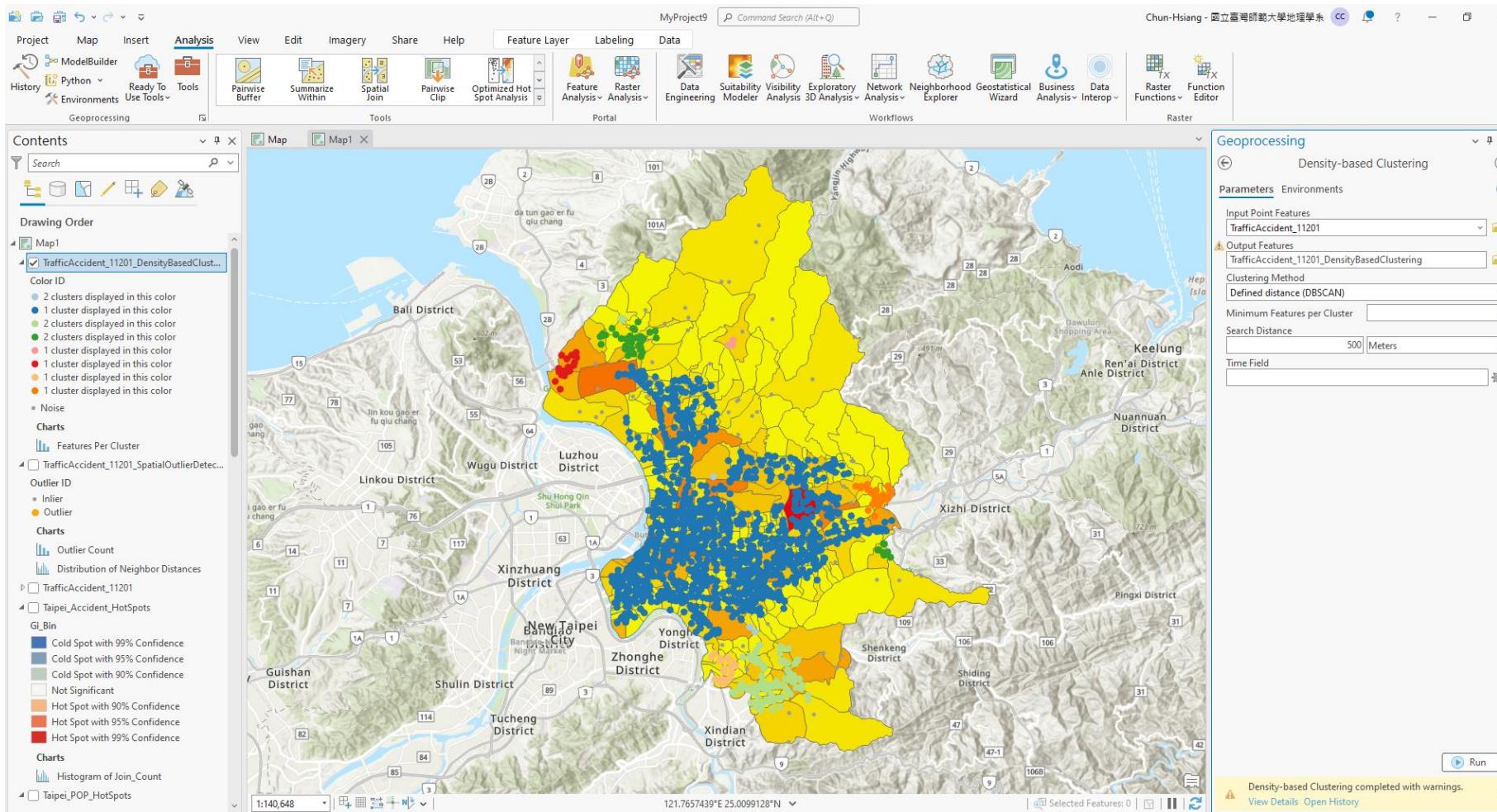
Density-based Clustering :: DBSCAN

MinPt: 5; SearchDist: 500



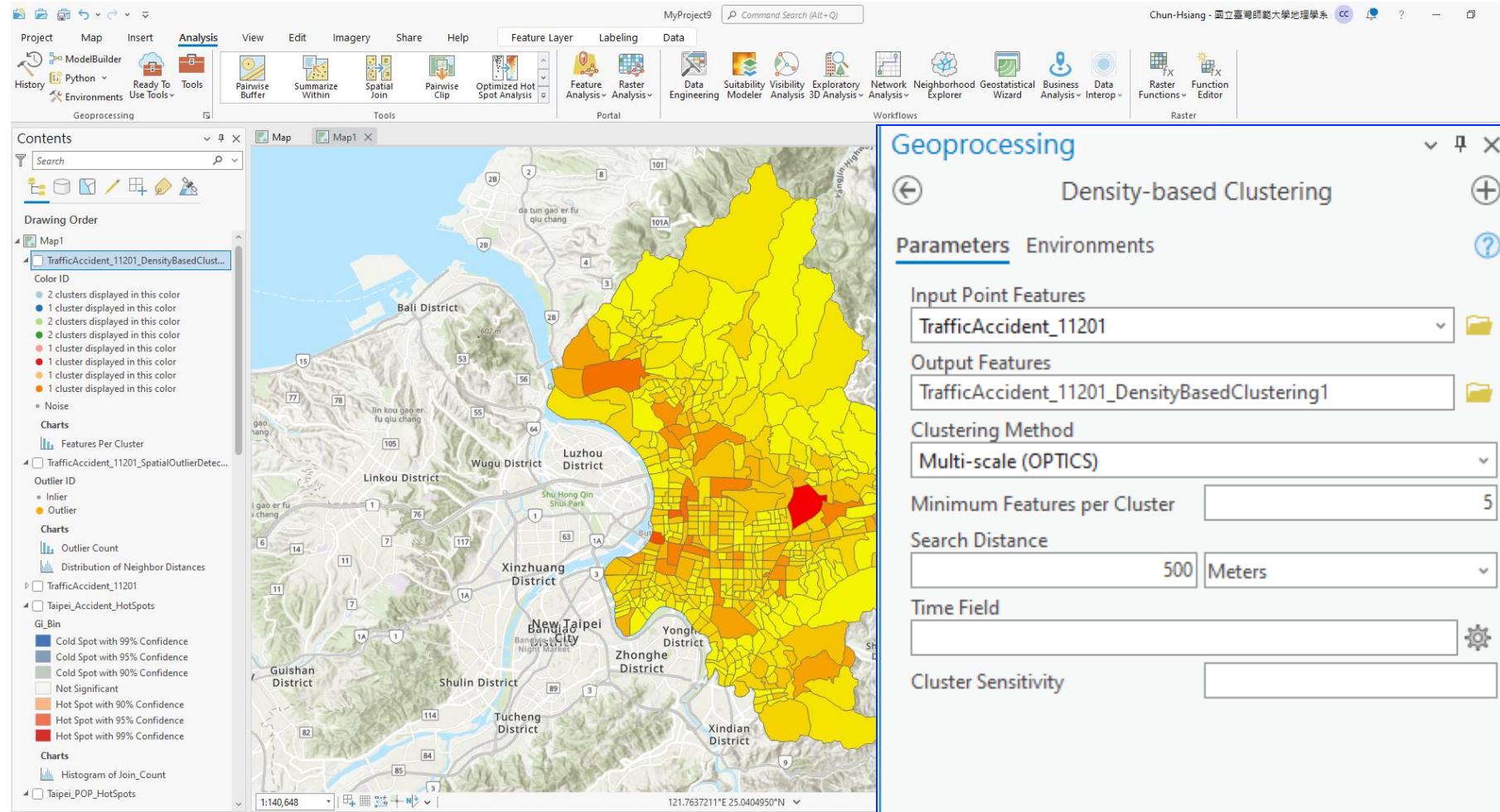
Density-based Clustering :: DBSCAN

MinPt: 5; SearchDist: 500



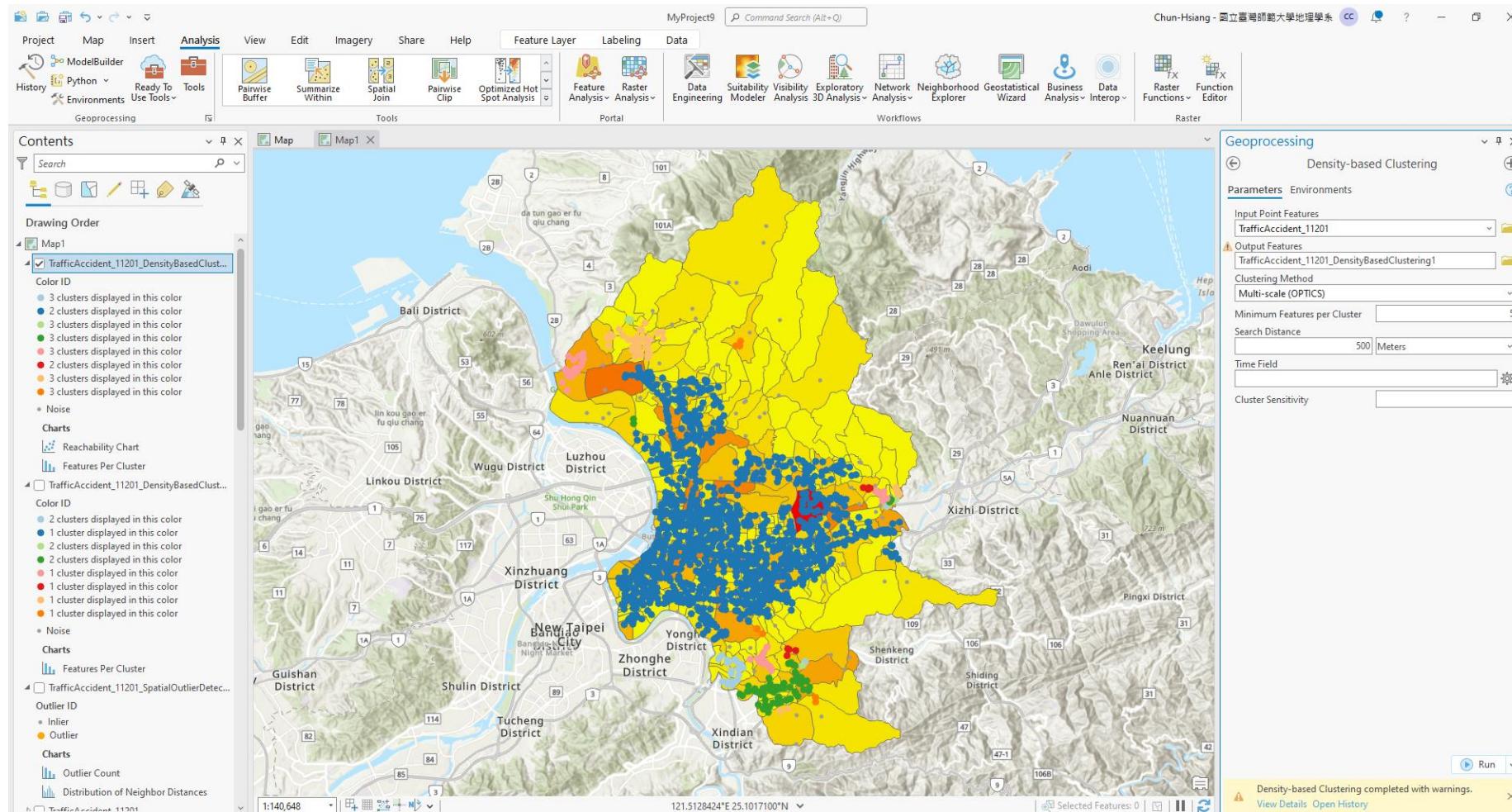
Density-based Clustering :: OPTICS

MinPt: 5; SearchDist: 500



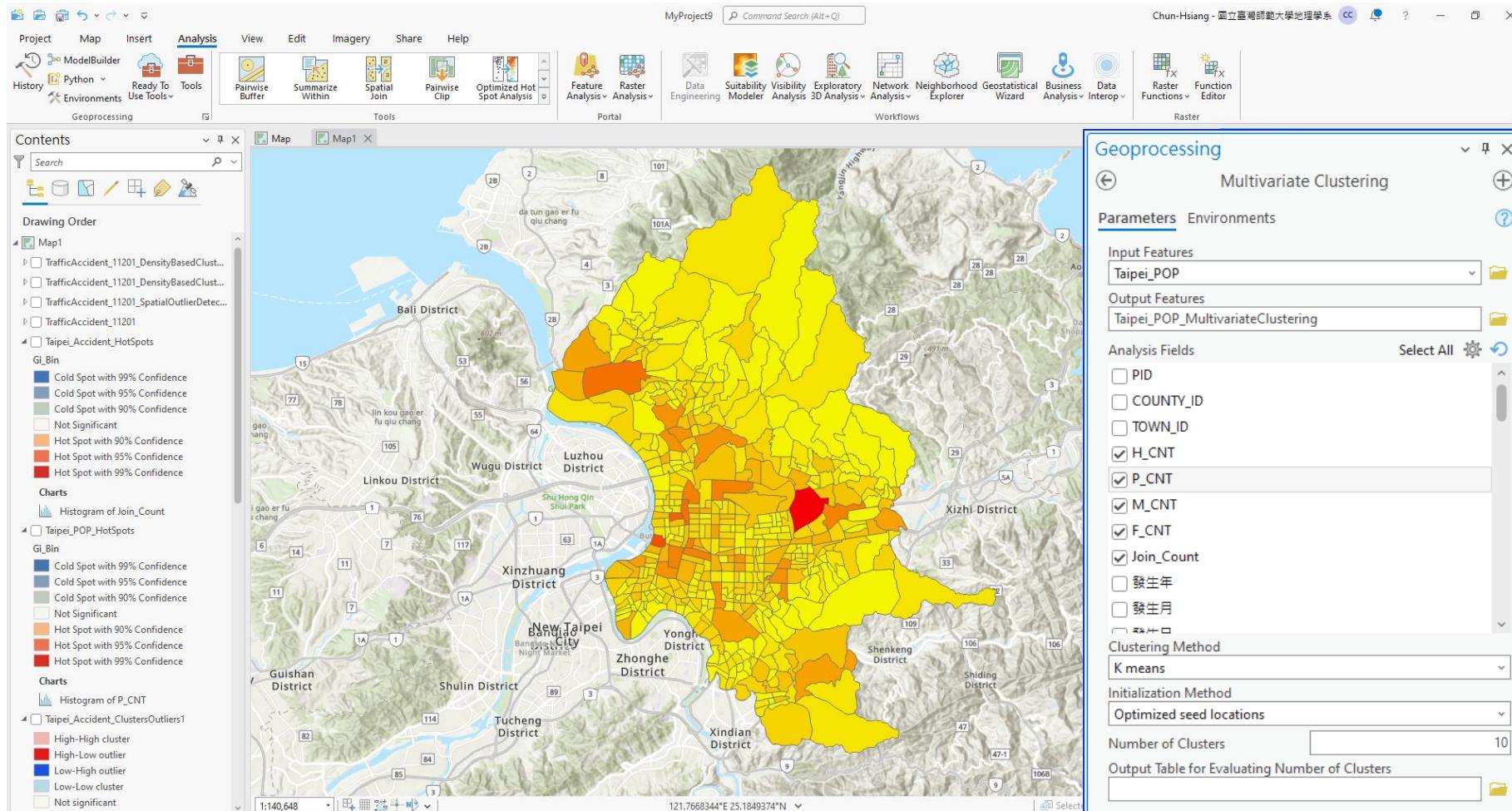
Density-based Clustering :: OPTICS

MinPt: 5; SearchDist: 500



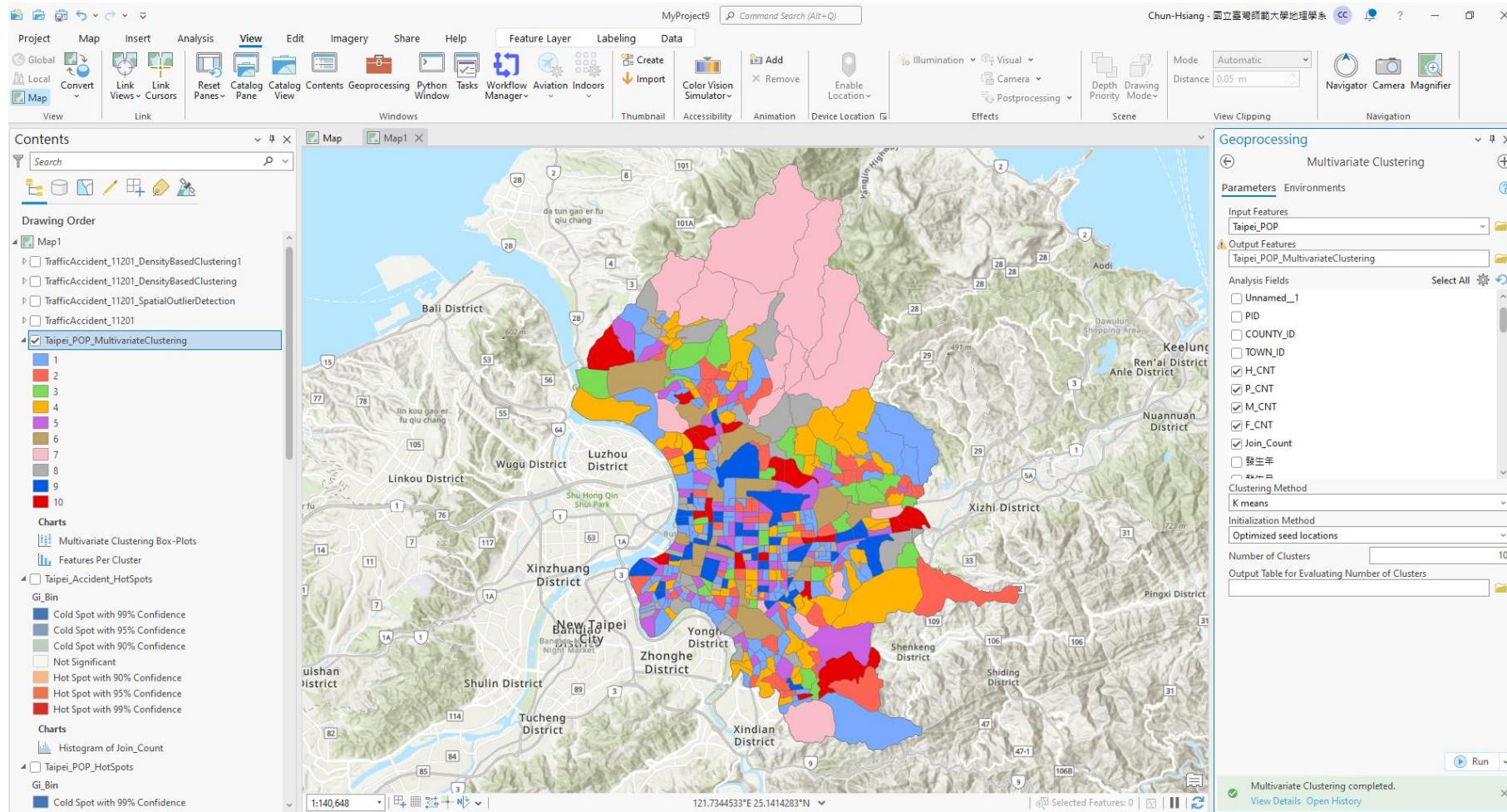
Multivariate Clustering :: k -means

NumCluster: 10



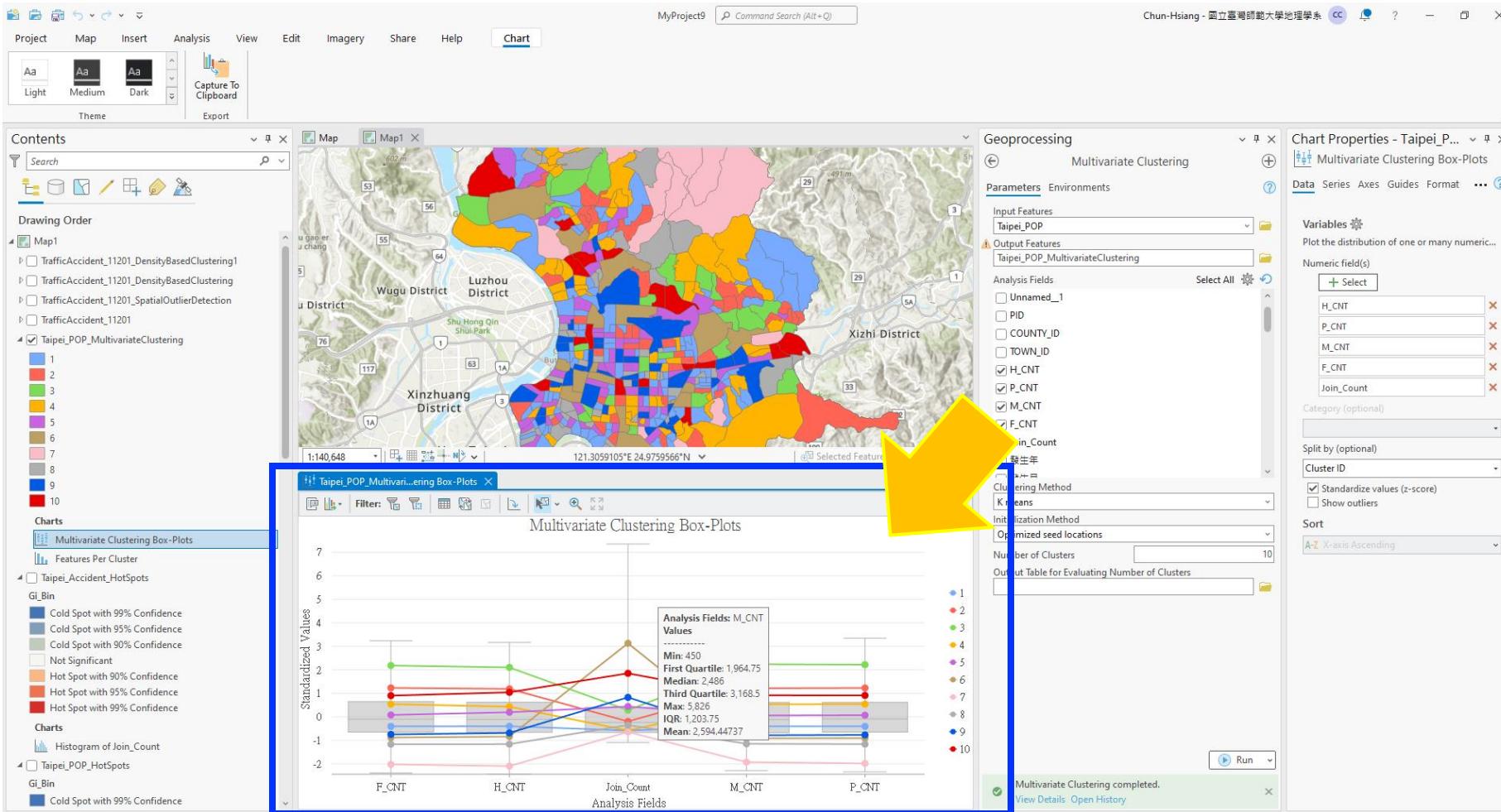
Multivariate Clustering :: k -means

NumCluster: 10



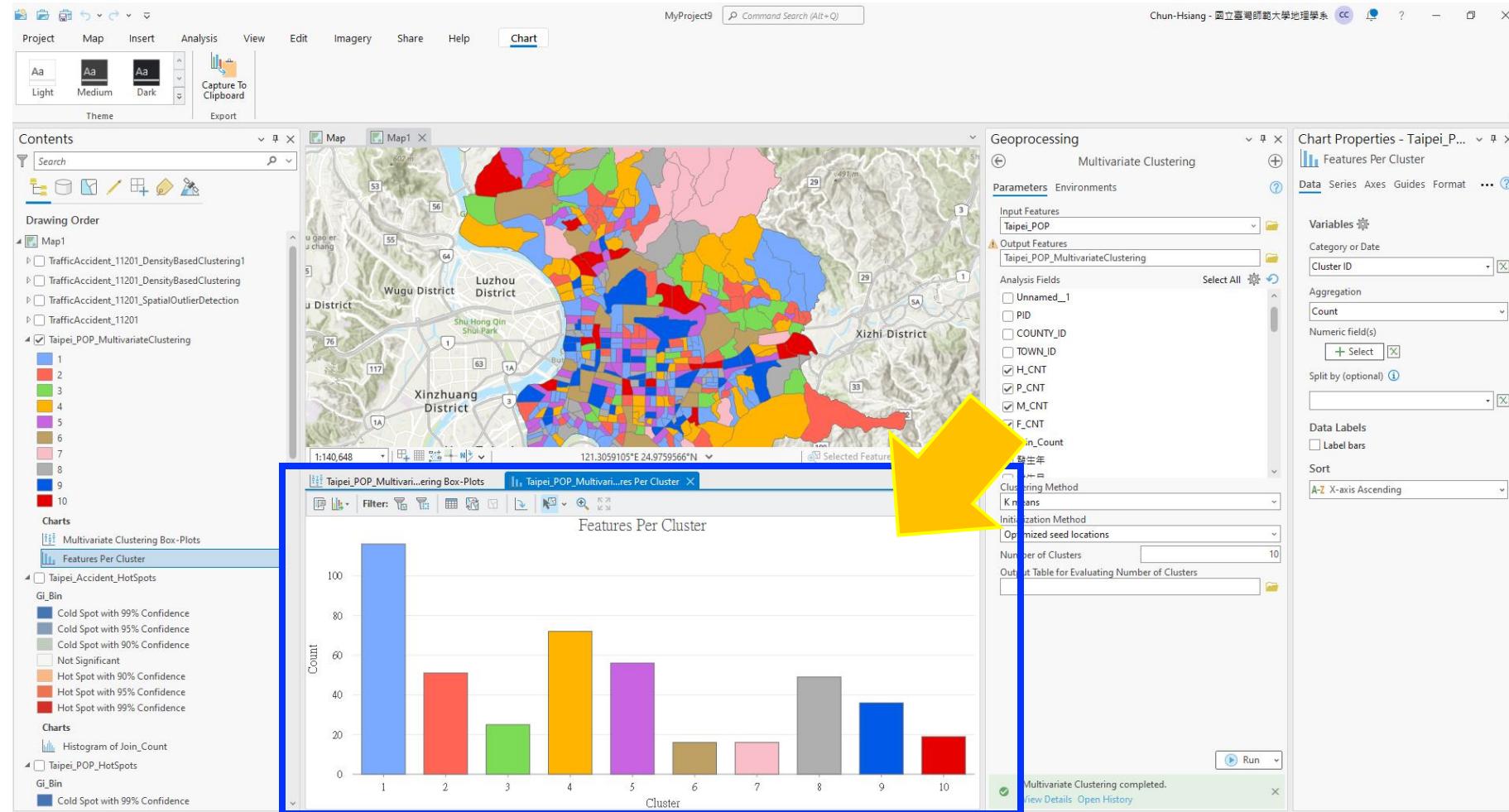
Multivariate Clustering :: k-means

NumCluster: 10



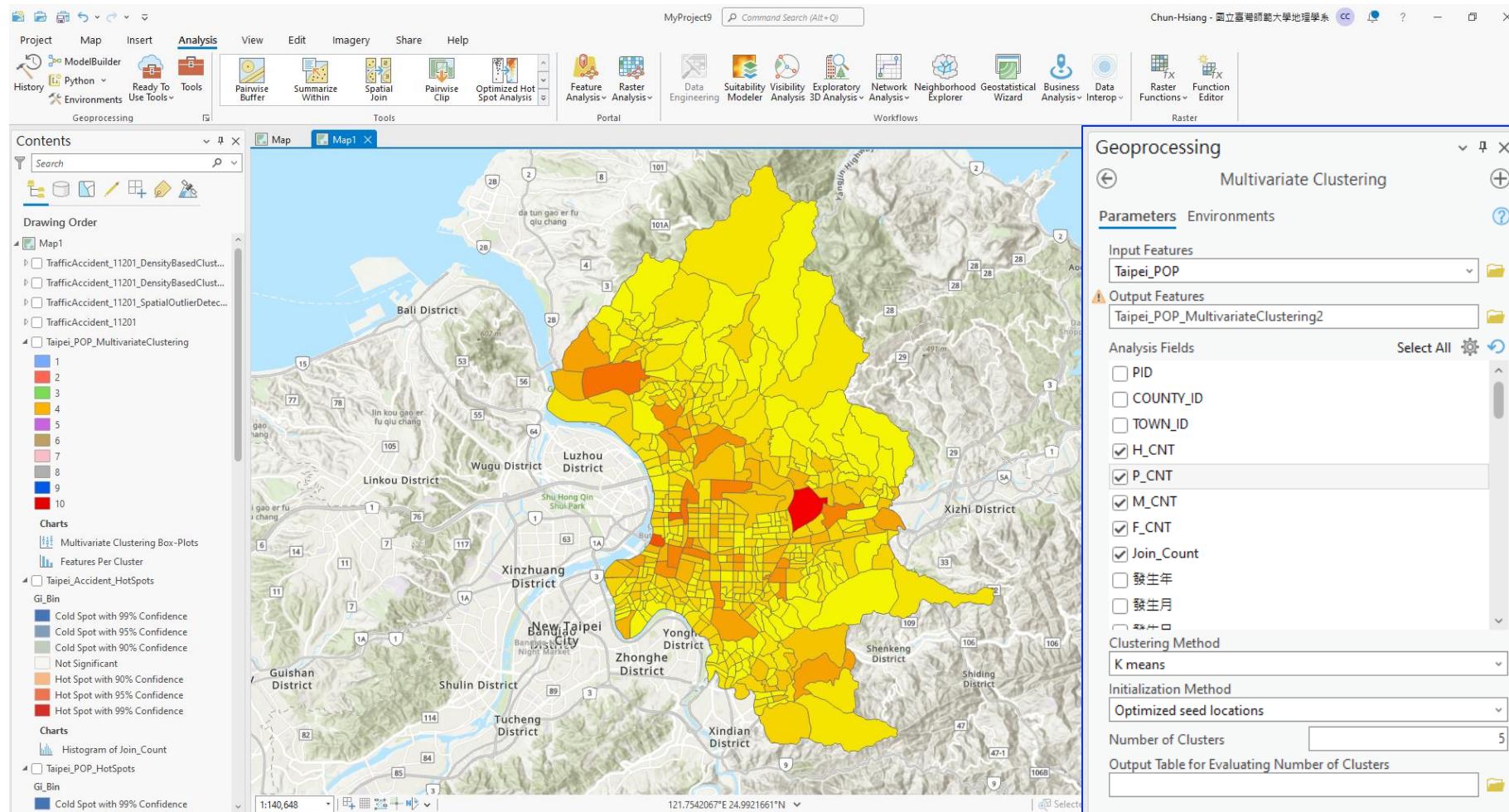
Multivariate Clustering :: k -means

NumCluster: 10



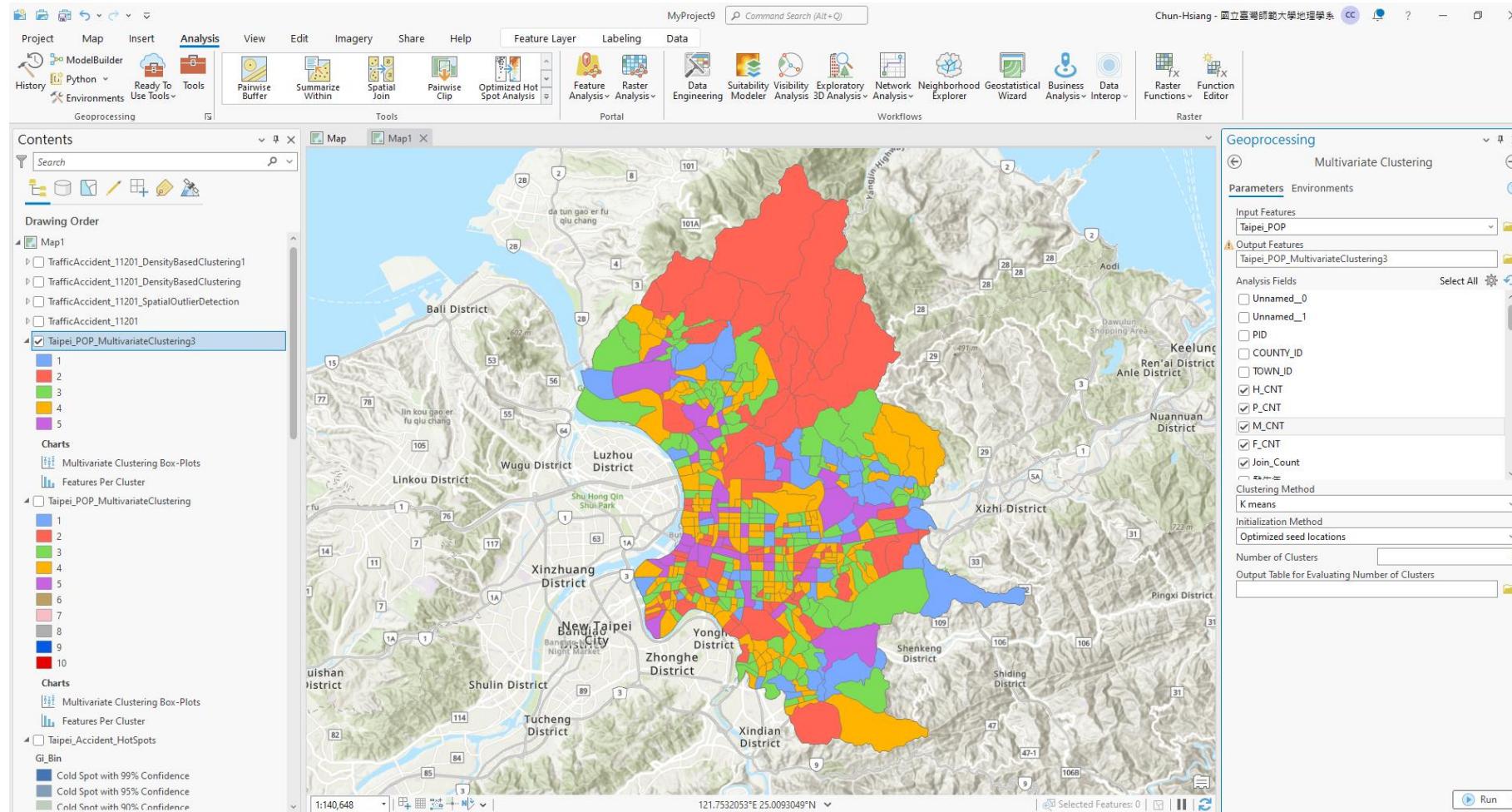
Multivariate Clustering :: k-means

NumCluster: 5



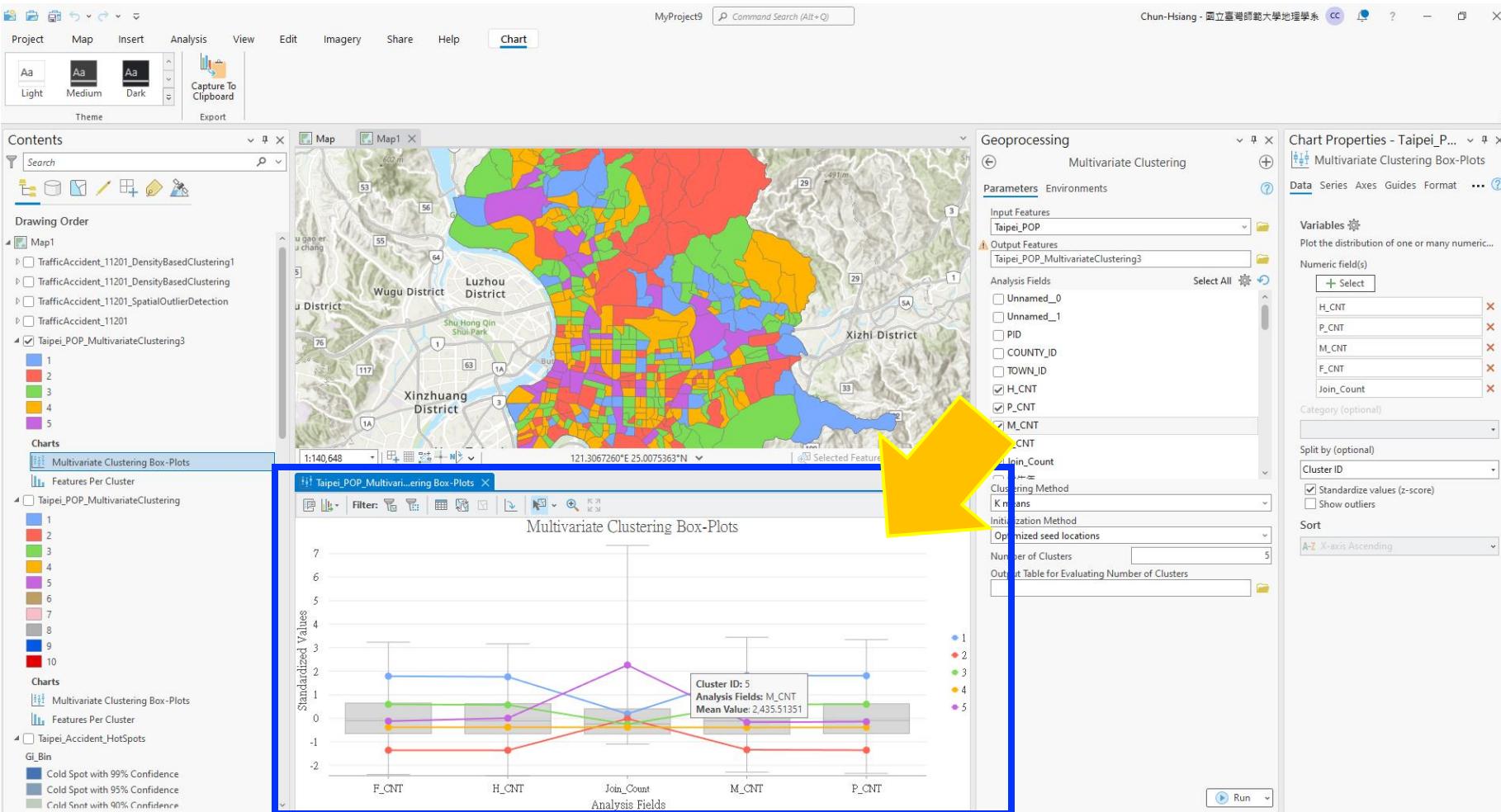
Multivariate Clustering :: k-means

NumCluster: 5



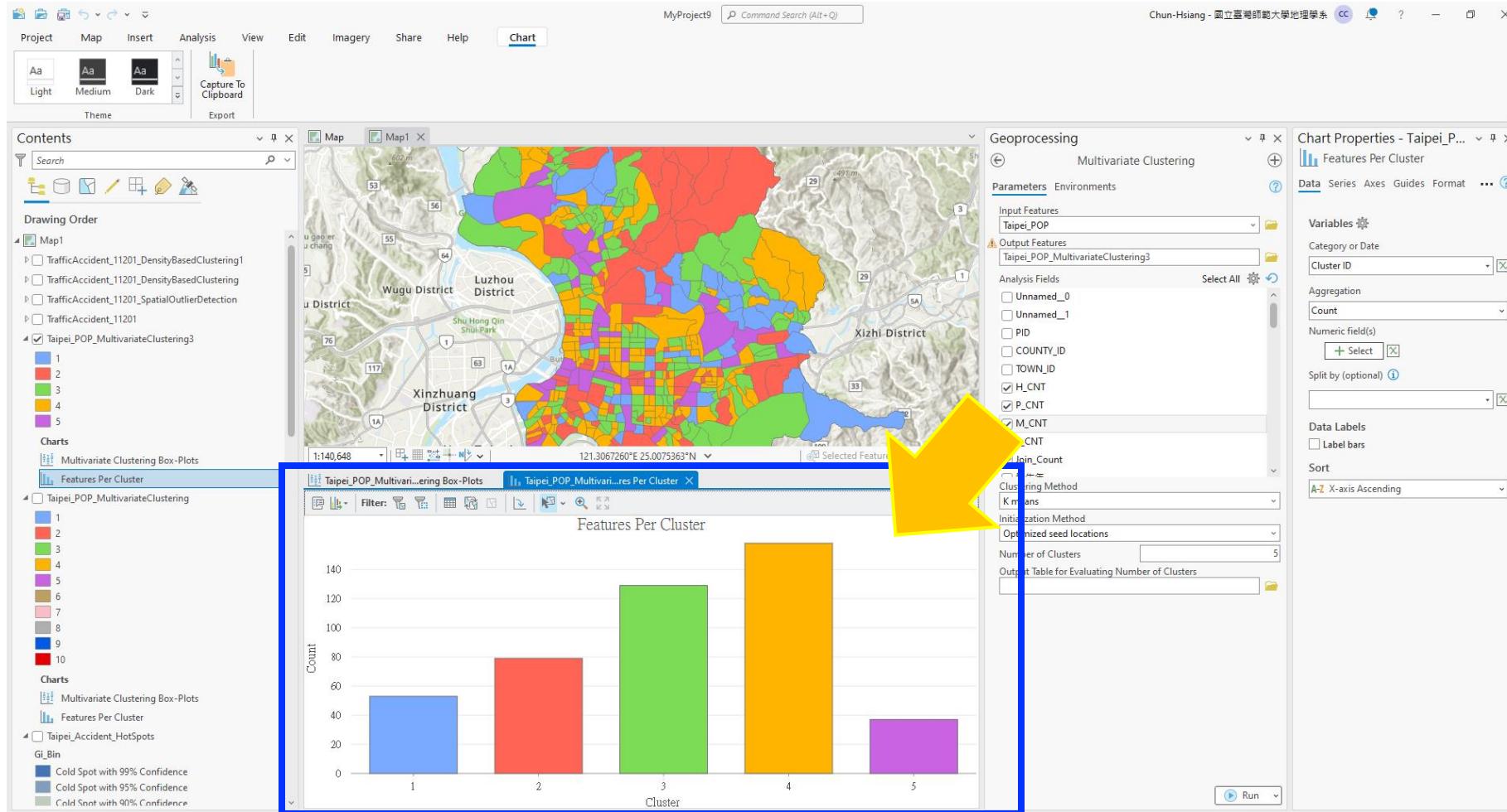
Multivariate Clustering :: k-means

NumCluster: 5



Multivariate Clustering :: k-means

NumCluster: 5



Notice

- You have to explain the meanings of the results point-by-point.
- For example...
 - We found that  district exhibited a statistically significant cold spot, whereas , , and  districts demonstrated statistically significant hot spots. Because the population of  was relatively low; however, the neighboring districts at least had an average population.
 - ...

The End

Thank you for your attention!

| Email: chchan@ntnu.edu.tw
Web: toodou.github.io